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The Problem of Employee Selection—I

"EXAMINATIONS," it has been written, "are formidable even to the best prepared; for the greatest fool may ask more than the wisest man may answer." In that saying lies concealed the philosophy of the problem of selection of human material as it appeared to the past generation. The best man was he who passed the highest examination with the greatest number of marks. To pass an examination one should "prepare" by committing to memory a vast number of facts and, in addition, by indulging in a series of mental exercises that were intended to give facility in performing the same or similar exercises in the examination room. The existence of "crammers," men or institutions that made a detailed study of past papers and by assessing the probability of any particular question being set concentrated on teaching those answers that would please the examiners, is evidence of the widespread acceptance of this view.

Some time ago we printed an abstract from Dr. Tucker's lecture "Wanted—an intelligent youth," in which Dr. Tucker, when discussing the examination side of his subject, laid stress on the need for phrasing the questions in such a way that to write satisfactory answers did not require only a good memory, but some real effort of mind. "The correct type of question is one in which the student is required to draw on his facts, and then by analogy and inference, involving conscious or unconscious processes, arrive at an answer." Recent discoveries—the word "discoveries" is used advisedly—suggest that this is not the whole story, and that not even by framing the most intelligent questions can the sheep be separated from the goats.

This problem of examinations is discussed here because of its inherent importance in chemical industry in particular and in industry in general. One of the most important functions of management is to select suitable workers. But there are difficulties inherent in this apparently simple process, and certain of these difficulties arise because the staff or workmen of a factory comprise in essence a team that must work in harmony and in which each has his special part to play. All too frequently in industry this problem of selection and blending is left to be solved by the results of examination; particularly is that so, for example, in the Civil Service. In the higher walks of chemical industry few applicants are admitted without the "hall-mark" of a university degree—which can be obtained only by examination. In the lower walks promotion, bonuses and so forth are obtainable often upon the results of attendance at evening classes, again assessed primarily by the end-of-session examinations. Many firms refuse to engage staff unless either the matriculation or the school certificate has been passed. Our whole industrial system of employee selection is permeated by this idea of examination. Examination as generally conducted, as Dr. Tucker has indicated, is frequently nothing more than a test of memory, a test, in short, of one particular characteristic that in these days of pencil and paper and of reference books, is becoming of ever less value. Supposing, however, that there is no other way of employee selection, are the results of examinations of intrinsic value in themselves?

In answering this question, let it be granted that the examination questions have been intelligently set. The answer is provided in a little booklet "An examination of examinations," by Sir Philip Hartog and Dr. E. C. Rhodes, a summary of the report of the English Committee set up to examine the subject by the International Conference on Examinations. It is unnecessary to discuss this document, but here are some facts contained in it:—Qualified and experienced examiners were appointed to mark papers under the same conditions as obtain in practice. In a school certificate paper seven examiners gave to one candidate the following percentage of marks: 28, 32, 46, 56, 58, 80. In a university honours examination the candidates were put into grades, 24 being the highest. Of ten examiners one placed a certain candidate in grade 5, and another placed the same candidate in grade 16, whilst the average difference between the highest and lowest marking of each of 18 candidates was no less than 11.4 grades. In *vivo voce* examinations the same differences persist. Of two interviewing boards for the Higher Division of the Home Civil Service, Board I placed a candidate first whom Board II placed 13th; whilst Board II's favourite was placed 11th by Board I. On another occasion 14 examiners marked each of 15 school certificate papers, giving a verdict only of failure, pass or credit; then, after a lapse of time, not less than 12 months nor greater than 19 months, the same examiners marked the same papers again. There were thus on each occasion 210 verdicts—and on the second occasion in 92 instances the examiner altered his verdict.

These few examples, selected out of many, must give pause to those who believe that the possession of a certificate is some guarantee of the mental quality of its possessor. It is perfectly plain that at present a certificate that a candidate has passed a given examination, whether with or without honours, is of most doubtful value. Even the most competent examiners dealing with their own particular subject cannot agree, either among themselves, or in their own individual minds after a lapse of time, as to the value of any set of written or spoken answers.

Notes and Comments

Wear and Tear Allowance

ONE of the most important innovations of the draft Bill accompanying the report recently prepared by the Income Tax Codification Committee is the proposed method of dealing with wear and tear allowance in regard to income tax. The proposal is that instead of these allowances being treated as a relief from the assessment, they should be made a business charge in the year in which the depreciation takes place. Provision is made whereby the present advantage of carrying forward wear and tear allowances indefinitely would not be interfered with in the event of there being insufficient profits within six years to absorb losses. The machinery to determine the deduction allowed for wear and tear set out in Rule 6 of the rules applicable to cases 1 and 2 Schedule D, finds no place in the draft Bill. It may well be that this omission was deliberate on the general ground outlined in the report that allowable charges against profits for Income Tax purposes should be based on commercial practice, and with this in view and the ordinary procedure of appeal, the position is regarded as satisfactory by the Federation of British Industries, which has submitted its views on the report and draft Bill to the Chancellor of the Exchequer. The special committee of the Federation, which has made a careful examination of the report and draft Bill, records its profound admiration of the thoroughness and ingenuity which have enabled the Codification Committee to produce such an admirable result. The Federation expresses approval of the scheme and arrangement of the draft Bill, and urges that an Income Tax Bill following the general lines of the draft Bill should be laid before Parliament at an early date.

Synthetic Rubber Dangers

UNTIL comparatively recently synthetic rubber has never had an opportunity for large-scale development, but the abnormal economic conditions in Germany and Russia may give synthetic rubber its long awaited opportunity. Synthetic rubbers are now available which are definitely better than natural rubber both from the point of view of resistance to abrasion and other properties and are therefore in a position to command a market at a higher price. Results of researches carried out in Germany under the auspices of I. G. Farbenindustrie are said to have produced not only a satisfactory substitute for rubber, but a superior commodity in those respects in which the natural product is alleged to fail. On the other hand, however, the synthetic rubber processes as practised in Germany and Russia create new industrial hazards. L. S. Skhol-Engberts and K. V. Migai discuss this aspect in the "Journal of the Russian Rubber Industry," 1935, *12*, 463. According to a translation published in the " Rubber Age," "SKB" synthetic rubber contains 1.4 to 2.0 per cent. of metallic sodium (calculated as the carbonate), an unpleasant metal which may occasion fire risks in the presence of moisture and which can result in painful and serious attacks of dermatitis and skin burning under improper conditions. More insidious is the presence of 0.1 to 0.2 per cent. of volatile hydrocarbons, four-fifths of which is butene. This slowly escapes into the air of synthetic rubber stores, and is expelled from the rubber during mixing operations and working with stock. Any mixtures containing from 1.63 to 9.9 per cent. of butene in air are explosive, while to be safe from risks of poisoning the concentration of butene in air should be not more than 1 to 100,000 in air or 0.1 mg. per litre.

Chemists' Salaries

DURING the past few months the appointments bureau of the British Association of Chemists has been exceptionally active, due partly to the general improvement in industrial conditions and partly to the fact that the bureau is becoming better known to employers. It is of interest to learn from the Association's journal that there is a general tendency towards a rise in salary, the unwritten minimum for a qualified chemist having risen by something like 7 per cent. This improvement has not been secured by stipulating that salaries must be paid according to a fixed scale; indeed, the Association, unlike many trade unions, has always recognised that such a policy is undesirable for a professional body, and that a fixed minimum salary is liable to become a fixed maximum. A point which the Association has always made, particularly with employers who are appointing a chemist for the first time, is that it is more economical to appoint a man who can use initiative at a higher salary than a routine worker at a minimum which gives him no incentive to use initiative. In some instances very few applications are received for posts commanding high salaries, not because there are not chemists qualified to fill them, but often because the chemist fails to realise that there are posts available for young men with sound experience.

Dyewares Still Too Dear

FOR many years Sir Henry Sutcliffe Smith has drawn attention at the annual meetings of the Colour Users' Association to the unduly high prices for dyewares. He reiterated his protest at Manchester last week when he urged that it was quite time the dyeware manufacturers, both British and foreign, made a real effort to bring their prices down to a level more in accordance with the wholesale commodity figure, which is now 110.1 as compared with a basis of 100 in 1913. Taking some twenty dyewares that have been in common use continuously since 1913 (15 of them British and 5 foreign) Sir Henry has found that users are charged from a minimum of 100 to over 200 per cent. more than in 1913. Four months ago Sir Harry McGowan, in his speech at the annual meeting of Imperial Chemical Industries, Ltd., said: " We endeavour to keep our prices as low as possible . . . as low prices in the long run stimulate a greater volume of trade; as our products are the raw material for the great industries of this country. The less we charge, the more competitive should our customers become; and every increase in their trade means a greater volume in our own." With Sir Harry McGowan's policy Sir Henry Sutcliffe Smith is wholly in sympathy, but from his own investigations he cannot say that the prices quoted for many dyewares to-day are even reasonable, and the ratio of their cost in the treatment of the colour user's goods has become most burdensome.

Progress in Microscopical Research in Chemical Laboratories

By ALFRED SALMONY, Ph.D.

IT has long been recognised that fundamental improvement in the microscope was practically impossible, the optical combinations and their manufacture could not be excelled and the limit of linear magnifications had been reached. But there still remained one point where perfection was desired, namely in the production of photomicrographs, to facilitate and simplify microscopic research by sharply defined photographs. A few years ago, therefore, a special new development in microscopic technique was launched which aimed at devising instruments combining the organic constructiion of a modern microscope with a built-in camera. Several models were put on the market, for instance, the English construction by Vickers, the Austrian "MeF" Universal-Micro-Camera, and further, the Neophot, Panphot and Metaphot. In each case the construction was intended to satisfy the high requirements expected of such instruments, particularly in metallography, but it soon became apparent that the micro-camera is a valuable aid in the multifarious microscopic work in chemical laboratories.

The Micro Camera

The endeavour of the designer was to make the manipulation of the micro-camera as simple as possible and the transference from one kind of illumination to another, and especially from visual observation to photomicrography, easy and convenient, and lead partly to quite a new form of instrument. To obtain a compact instrument requiring the minimum of space, with the "MeF" and the Metaphot, the objective was arranged underneath the stage, *i.e.*, the microscope was reversed. This ingenious arrangement enabled

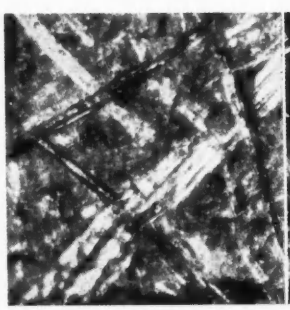


Fig. 2a. Leather-board in bright field (V = 72)

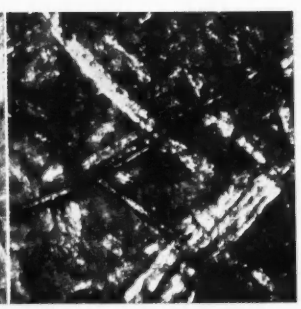


Fig. 2b. Leather-board in bright field in polarised light (V = 72)

the camera to be fixed with a ground glass placed at a comfortable height for observation in the base of the instrument and to avoid accessories in the vicinity of the base which impede the movements of the user's hands. With the Panphot the camera, a mirror reflex camera, was placed on top of the microscope with the Neophot, the old optical bench was retained, but by fixing four so-called "swinging vessels" it is protected against the danger of disadjustment or decentring through impacts and vibration. In order to allow prolonged observation in an easy and non-tiring position, the ocular tube upon which a binocular stereo adapter can be placed, was fitted obliquely on a level with the eye of the observer. The Metaphot built on these principles (Fig. 1) is shown in practical use.

Fig. 1. The modern Metaphot camera-microscope in practical use.

Experience has shown that the present-day largely perfected illumination technique in general permits working with lower magnifications which has the advantage of facilitating and accelerating discernment of particular features of an object as well as precise focusing. The observation power is, however, in no way impaired. Fig. 2 shows a sample of leather-board in bright-field in the usual light; Fig. 2b in polarised light, 72 times magnified. Fig. 3a shows a copper-oxide sheet in bright-field; Fig. 3b the same sheet in dark-field with V=300. Of course, it is not to be understood that examinations in chemacal laboratories can always be done with such relatively low magnifications.

Production of Photomicrographs

By the use of suitable photographic material the production of photomicrographs presents no difficulties. The photograph of a sample of sebanic acid in polarised transmitted light, bright-field, V=90, as shown in Fig. 4a, was obtained quite simply with a "Braunsiegel" plate using a yellow filter and giving an exposure of 4 secs.; Fig 4b shows a sample of sebanic acid from hardened material in transmitted polarised light, bright-field, V=165, also taken with a "Braunsiegel" plate and given a 4 secs. exposure with a yellow-green filter. A 30-watt low-voltage bulb, with aspherical condenser in housing, sufficed in most cases for ilumination. If a greater luminosity is required a 50-watt lamp can be used in which the two filaments are arranged one behind the other in the direction of the optical axis of the beam of light. With very high magnifications and specimens with numerous fine details, a small arc lamp assembled on the same cast iron ground plate as the micro-camera can be used for obtaining good contrast plates with a short exposure.

The universal equipment of a camera-microscope for all examinations in chemical laboratories is shown in Fig. 5. As can be seen from this illustration, the lamp-housing is arranged in conjunction with a switch mirror and Abbé's illumination apparatus with adjustable iris diaphragm holder, and assembled on a study carrier which is attached to the instrument by means of a long dove-tail guide. Between the lamp and the mirror there is sufficient space for insert-

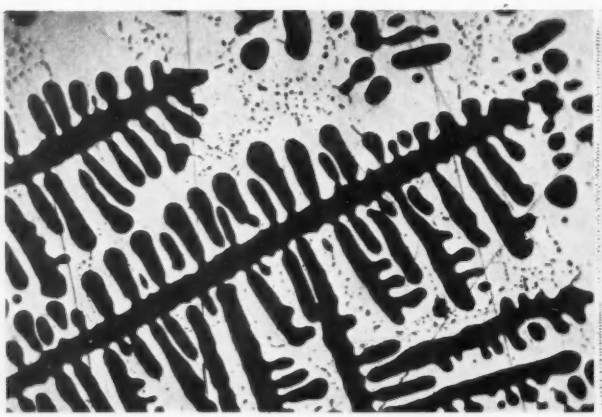


Fig. 3a. Cuprous oxide in bright field (V = 300)

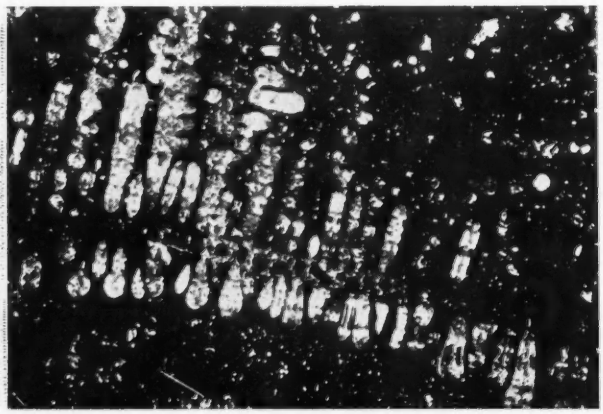


Fig. 3b. Cuprous oxide in dark field (V = 300)

ing a through flow trough which will absorb the unavoidable radiation heat and protect delicate objects, such as crystals or organic materias with a low-melting point, etc. It is possible simultaneously to insert below the deviating mirror 1 or 2 colour filters, 60 x 60 mm. Such filters are indispensable when photographing coloured objects, 6 filters (red, orange, yellow, yellow-green, blue-green and blue) being obtainable. The selection of the filters depends upon the colour of the object, and the colour-sensitiveness of the photographic plate must be suited to the filter used in order to obtain a correct reproduction with full contrast and gradation of light.

Observations in Reflected Light

For observations in reflected light, the transmitted light equipment is removed from the instrument and the lamp on the left of the instrument (which is fixed on a strong projecting arm) is switched on. As it is on a level with the vertical iluminator, the light from this lamp passes straight to the illuminator prism or to the plano-plate and thence to the objective, without being deviated by light-absorbing objects such as the mirror. Either the usual bright-field vertical illuminator (with prism and plano-plate) or the new bright-field dark-field illuminator, the "Univertor," can be used. Both types are fitted with a special condenser holder for using the Köhler illuminator. Very often it is particularly advantageous to use a combination of reflected and transmitted light or oblique reflected light and transmitted light, as suggested by Professor Dr. Hauser. An oblique light illuminator which can easily be screwed to the micro-camera is sufficient for producing full contrasted pictures of objects with surface structures running in a specific direction, as, for instance, fibres of wood and paper, pore formation in leather, etc. With the Hauser illumination, a sharp contour is produced by transmitted light, while reflected or oblique illumination brings out the rich contrast and plastic effect. The advantage of the Hauser illumination is seen from Fig. 6, which shows a piece of cotton muslin with V=28, such as is used by colour chemists for testing dyes.

Testing Foodstuffs

For microscopic work in testing foodstuffs, fats, metallographic examinations of corrosion, etc., polarised light is indispensable. Fig. 7 shows the necessary equipment for polarised transmitted light in its latest form. It consists of a polarisation illuminating apparatus in which a double condenser, a diaphragm, a detachable gypsum disk and a polarisator large enough to fully utilise the numerical aperture of 1,20 are incorporated. To obtain the best illumination suitable for low and high magnifications, the condenser can be swung out of the pathway of light. Attached to the microscope tube is a special intermediate part with analyser which can be rotated by 90° over a scale divided into 5°. With the equipment for polarised reflected light the polarisator is mounted so that it can be rotated on the illuminator tube of the vertical illuminator, into which the gypsum disk is placed. The analyser can be rotated a distance of 90° and is accommodated in the attachment part between tube and

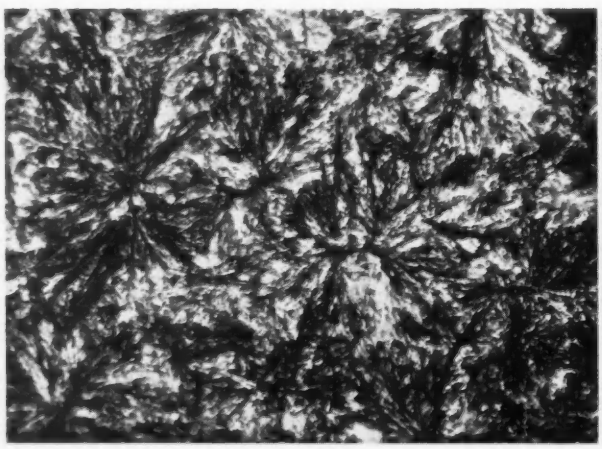


Fig. 4a. Stearic acid in polarised transmitted light (V = 90).

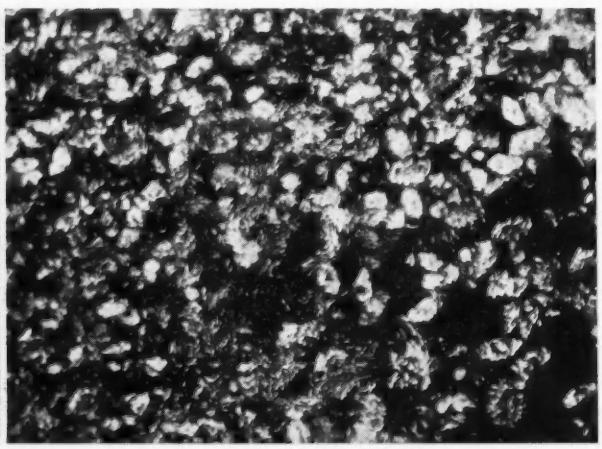


Fig. 4b. Hardened sebanic acid in polarised transmitted light (V = 165).

vertical illuminator. For examinations in polarised light with the large mechanical stage, an inset which rotates easily in a cone ring having removable preparation clips has been evolved. This inset is graduated for 360° and is so con-

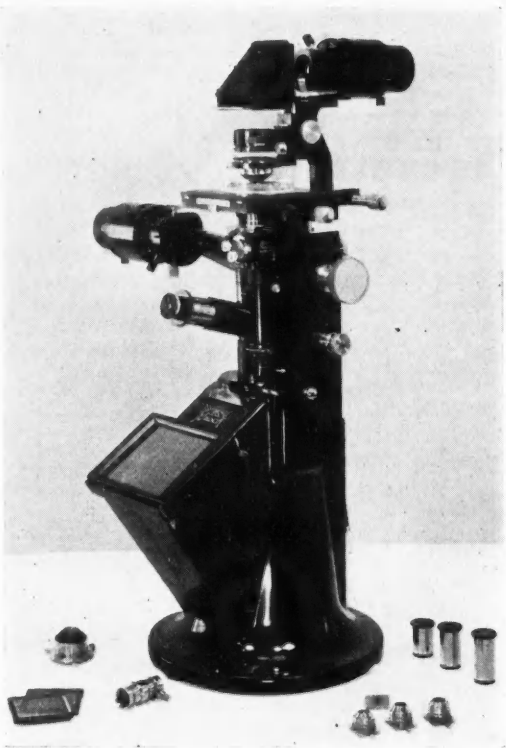


Fig. 5. Modern universal camera-microscope.

structed that even large mineralogical sections of thin diameter can be readily mounted on it.

It is often useful with chemical examination to observe and photograph chemical and physical reactions which occur in the treatment of a preparation with a certain reagent. For this purpose, a great number of photos must be taken in rapid succession, *i.e.*, a micro-cinematograph apparatus should be

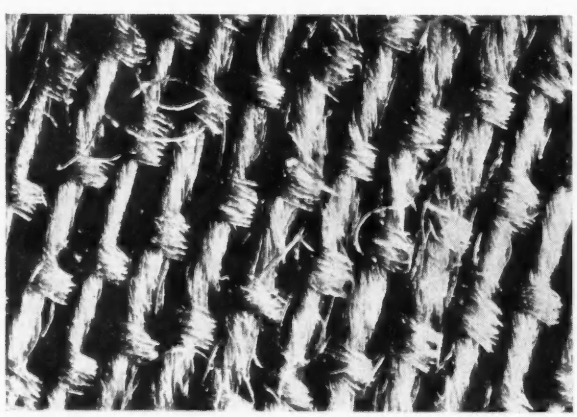


Fig. 6. Cotton muslin in Hauser illumination (V = 28)

used. Such an apparatus is the Siemens-Busch instrument (Fig. 8), for which any narrow-gauge film camera with 16 mm. narrow-gauge film can be used. A microscope of usual form is accommodated on a strong stand and connected by means of a tube-shaped intermediary piece with the

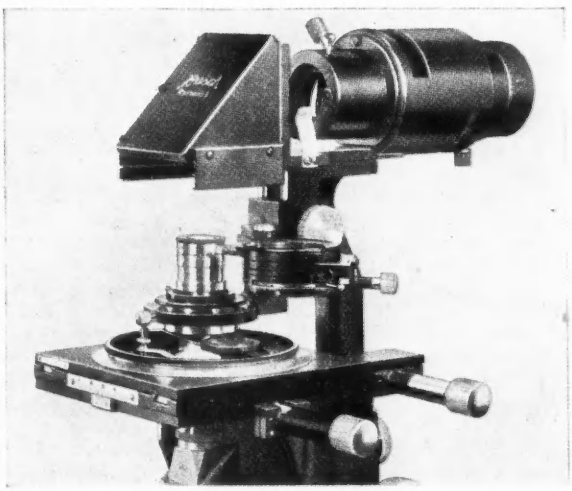


Fig. 7. Equipment for polarised transmitted light.

narrow-gauge film camera fixed above it. Inside the tube there is, at the lower end, a partly reflecting surface which conducts a small percentage of the light into an observation telescope through which the development of the series of photos can be checked. A simple example of the possibilities of adaptation is to observe the chemical compound de-crystallised from a saturated solution.

With the modern micro-camera the optics are so improved that any image focussed sharply in the eyepiece is reproduced with equal sharpness on the plate or film. With the Metaphot it was possible for the first time to observe and photo-

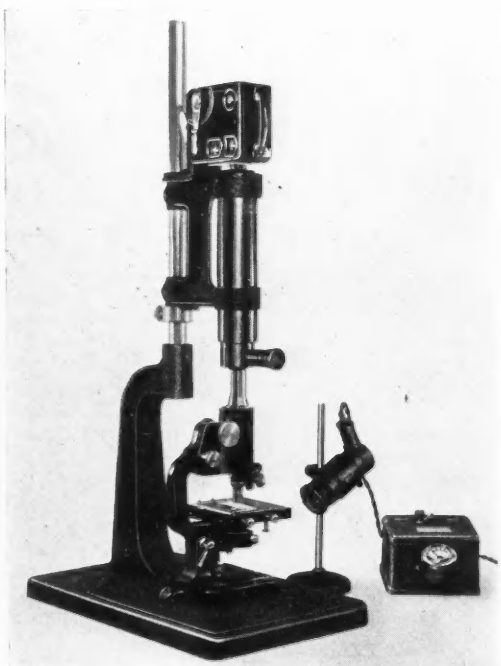


Fig. 8. Micro-cinematographic set (Siemens-Busch).

graph simultaneously, enabling the observer always to watch the most favourable condition of the object to be taken.

The equipment of the modern camera-microscopes has proved exceptionally efficient for producing so-called survey pictures, macro-photographs with the aid of anastigmatic objectives, as well as of sketches by means of a system of mirrors. Survey pictures are made with low magnification,

down to three times. The drawing paper is spread out beside the instrument on the working table, and the picture of the object is projected by a special projection arrangement and a swivel mirror on to the paper. Macro photographs and drawings are used for showing results of researches made, as often as required to a great number of people, and they are therefore particularly adapted for lecture and propaganda purposes, though they are very often used as a valuable aid for collecting results of tests aiming at improving working conditions and finding new working processes in order to study again and again the development of improving working conditions.

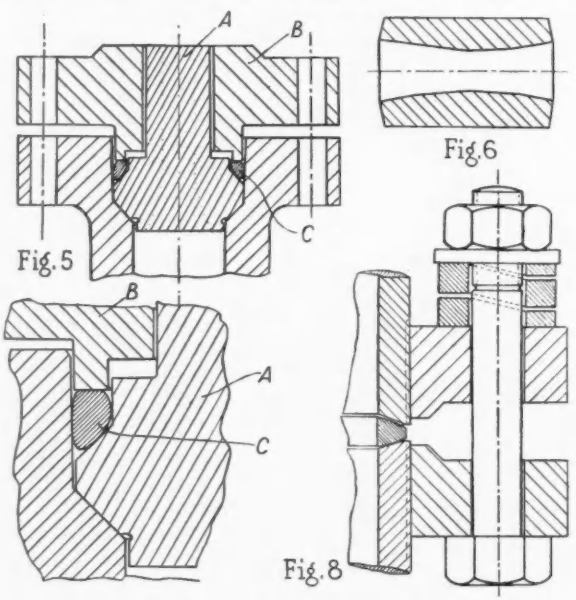
One of the latest perfections of the microscope which serves to replace the less convenient objective revolver of the camera microscope should be specially mentioned. With the Metaphot there is an oblique state guide (patented) in which as many objectives as desired can be inserted and held firmly in an exact centred position.

Tightening of Autoclaves and Pipes at High Pressures—II

By F. G. LAUPICHLER

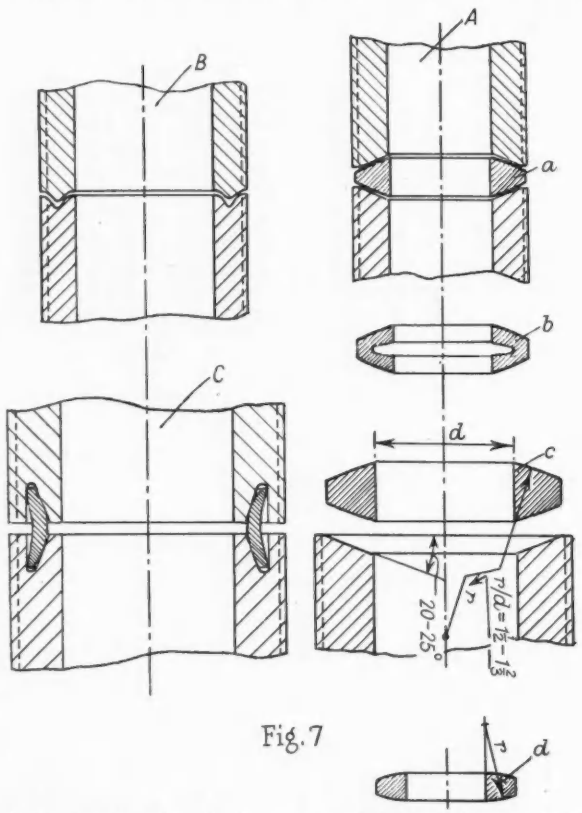
ACCORDING to the present state of the manufacturing technique of the materials suitable for high pressure equipment, the maximum temperatures to which vessels, pipes and valves may be subjected is about 500° to 520° C. This is due to the fact that even highly alloyed steels have such a low "creeping strength" that it is impossible to base thereupon the design with some degree of safety. As a rule, autoclaves inside of which reactions are to take place at these temperatures will be designed in such a way that the high temperatures are kept off the pressure bearing walls and covers. This applies at least to large reaction vessels. This method of design removes at the same time one cause for the sensibility of a large number of cover joints, namely, the "flowing" of the material as soon as the temperature is raised so high that the reduction of the resistance of the material permits further deformation.

The main reason, however, for the fact that many connections prove no more satisfactory when exposed to high temperatures, is not so much the absolute height of it, but the difference of temperatures of the various pieces making the joint. These differences are inevitable owing to the heat loss to the atmosphere, and they are increased by fluctuations of temperatures of the fluids or gases inside the vessel. The



formation of those differences is still favoured by the concentration of the iron masses in the surroundings of the joint, for the thicker the walls the greater the temperature differences between inside and outside surfaces if the same heat loss be presumed. How this effects the efficiency of the joints can be discussed in detail by reference to the design of Fig. 3.

As large-scale vessels are by no means heated externally, even if the reaction requires the conveyance of heat into the interior, we may content ourselves with considering only the case of the usual practice, where vessels are heated internally either by the liberated heat of exotherm reactions or by circulating hot gases or fluids inside the autoclaves. The walls of such autoclaves are inside warmer than outside, in consequence of which a deformation takes place, which is



illustrated by Fig. 6, in a strongly distorted way. This demonstrates that the bore is radially widened at the end and the plain surfaces of this is tilted somewhat, although the influence of this effect in practice is but small.

Importance of Temperature Difference

Far more important is the temperature difference of the parts of the connections at the spot where they are in contact with one another. If, for instance, in Fig. 3 the projection (A) of the cover has a lower temperature than the head flange of the vessel, the result will be that a radial shrinkage of the projection relative to the diameter of the vessel cone takes place, and the joint becomes liable to leak, unless the bolts have been sufficiently strained to be able to compensate this shrinkage by drawing the cover deeper into the vessel. In fact, the cover of the joint (Fig. 3) and its projection are always cooler than the vessel flange, as the cover receives heat by convection through an area that is but small compared

with that giving off heat to the atmosphere, while on the other hand a greater quantity of heat is transferred by conduction inside the walls to the ends of the vessel. The proper means to reduce these temperature differences consists in creating large contact surfaces between cover and vessel through which heat can be transferred to the former by conduction, but this again leads to the design of Fig. 2.

By far the most essential is the temperature difference between the cover screws and the flanges in the surrounding of the bolt-holes. This difference depends upon the measure in which heat is conducted from the interior of the autoclave to the bolts and flanges, and in this respect one has to distinguish whether ordinary head-screws or pin-screws (Stiftschrauben) are being employed.

The head-screws always seem to have a lower temperature than the flanges near the holes. The reason for this is that the bolts can receive heat by conduction only through the area of the head and nut touching the cover and the vessel flanges respectively, while the heat transfer to the shaft by convection is negligible due to the isolating effect of the air in the small space between the shaft and the bolt-hole. Thus the bolts, on their cylindrical surfaces, receive heat mainly by radiation, the quantity of which is very small.

Use of Pin Bolts

Quite different are the conditions, when pin-bolts (Stiftschrauben) are used. That thread which is inserted in the vessel flange receives heat by conduction through a large surface. Consequently, this part of the bolt has very nearly the temperature of the vessel flange, and as the heat is easily distributed inside the shaft all along its full length by conduction, it could often be observed that the average temperatures of the bolts were higher than those of the cover and vessel flanges. The bolts lose part of their original strength, and if the extension is great enough the cover moves outwards and permits the gas to leak through into the atmosphere. Broad contact surfaces between cover and vessel will reduce this undesired effect by permitting the direct flow of heat from the vessel to the cover, and for the same reason the gases or fluids inside the vessel must be allowed free access to the whole area of the projection inside the autoclave. It is for this reason also that the plate (2), shown in Fig. 4, has large openings, although this type is effected very little by elevated temperatures. This would be quite different with the design shown in Fig. 3; there, if the gas would be prevented by some means to transfer its heat to the projection, this connection would become entirely useless.

Another frequent reason for tightening difficulties can be mentioned, namely, the introduction of hot gases or liquids into the reaction vessel through bores or holes drilled radially through the vessel flange between two bolt-holes, as marked in Fig. 3 by dotted lines. Any temperature change of the fluids affects the two bolts in the neighbourhood of the bore more than all the others. It could be observed that a sudden increase of the gas temperature heated the shaft of the two neighbouring pin-screws to such an extent that they became entirely tensionless.

" Breathing " which spoils Contact Surfaces

The cover begins to work. Once it is drawn into the vessel at the side where the gas is introduced, another time in the opposite direction. This " breathing " spoils the contact surfaces and after a short time of operation the cover becomes leaky, and all surfaces have to be re-machined. People have tried to overcome the difficulties by putting some sort of heat insulation inside the bore, and experience has proved that in this way the influence of fluctuations can be reduced.

With the exception of the design shown in Fig. 4, all the joints illustrated are likewise useful for pipe connections when properly adapted for that purpose.

The joint shown in Fig. 5 is not used as an ordinary tube connection, but it is fairly often employed when the reduction from a bigger to a smaller tube is desired. In this case the cylindrical part (A) is extended above the cover and receives at the end a thread for fastening a smaller flange for the connection of the tube with the smaller diameter. The diameter reduction is attained in piece (A) itself in a manner illustrated by the dotted lines. It is, however, much more customary to give the lower part of (A) the shape of a lens like that most commonly used in high pressure technique for tube connections and illustrated by Fig. 7. The " lens-rings " for these joints are either made from the same material as the tube itself or from other homogeneous elastic metals. When the joint is tightened the surface of the lens-ring is permanently distorted. For this reason, any shape will be suitable whose surfaces are balls having their centres on the axis of the tube. The usual design of the lens-rings is shown in Fig. 7 (C), whereby sometimes the proportion r/d is reduced with increasing diameter. Even lenses of the shape of (d) can be found installed in high pressure plants, but they are by no means commendable.

Elasticity of Lens Rings

When inserting such rings, the flanges should be set absolutely parallel, otherwise the connection will easily become leaky when additional strain is put on it by movements of the pipe in operation (*e.g.*, vibration, elongation of tubes at higher temperatures, etc.). The argument that lens-rings whose surfaces are sections of a concentric ball permit slight inclination of the two pieces of tubes to be connected does not mean very much, since such inclinations require the tilting of the flanges and this puts additional strain on the bolts. Bending of the tubes is by far the better means to make such inclinations properly, and this the more as the comparatively small diameter of high pressure tubes permits easy bending.

The elasticity of the lens-rings is minute. They suffer a certain compression that is certainly favourable in regard to the durability of the surfaces (" cold-deformation "), but the elasticity is still further reduced by this contraction of the material. A high degree of elasticity would be a big advantage, particularly for joints that have to keep tight under high temperatures, and sometimes one finds lens-rings according to the design (b).

Another type of tube connection, shown in Fig. 4 (B), is one which is occasionally employed for joints of water mains. It has proved satisfactory when properly machined, which at the site is not easy. Fig. 7 also contains another tube joint (C) that is based on the principle to make use of the gas pressure for tightening. It has been developed by the author for use in pipes that are subjected to regular and extremely extensive temperature fluctuations, such as draining pipes through which hot liquors are from time to time extracted from reaction vessels. Here the temperature change in one case was as high as 400° C., when hot liquor was drained out of the reaction vessel every hour for about ten minutes, while in the meantime the pipe cooled down to almost room temperature.

The ring has to be designed and manufactured most carefully if the pressure really shall come into effect, and then this joint takes up the most robust changes possible in proper operation without causing the least trouble. The joint is expensive, and consequently the field of its application is limited.

Special Type of Tube Connection

A special type of tube connection is shown in Fig. 8. It is installed in some hydrogenation plants and in Benson boiler plants. Elongations or contractions of the bolts and flanges are here compensated by the elasticity of springs. Where it can occur that the connection is subjected to temperature above 400° C., great caution is necessary in the choice of the material of the springs, because it so happens that a number of them breaks to pieces even without any load, owing merely to internal tensions brought forth by the annealing process. The same effect can be largely achieved by using long bolts over which pieces of high pressure tubes are stripped instead of springs.

An Industrial Centenary

Growth of the Birmingham Battery and Metal Co.

THE Birmingham Battery and Metal Co., Ltd., has just celebrated its centenary. Whilst existence for 100 years is always an event of which a firm may be proud, more than usual interest is attached in this instance to a centenary of consistent progress and expansion achieved under an unbroken line of family management.

The name Gibbins had been associated with banking and the metal trade long before the formation of the company. It is believed that an earlier Gibbins had been interested in copper before the year 1793, when Matthew Boulton, of Soho, Birmingham, finding difficulty in obtaining supplies of copper for his mint, persuaded his friend, Joseph Gibbins, to join

General View of the Large Tube Mill

him in starting the Rose Copper Co. at Birmingham. Four years later that company purchased a copper smelting works in Swansea from Fenton and Co., with whom Boulton had been connected. Besides being interested in copper concerns Joseph Gibbins was a banker. He died in 1811 leaving several sons, at least five of whom were already associated with banking and the metal trade.

These five sons, two of whom were directors of the Birmingham Banking Co., together with eight other men interested in the metal trade, were the first proprietors of the Birmingham Battery and Metal Co., which was formed on July 1, 1836, to take over an insolvent concern in Digbeth, Birmingham, making wire, metal, general brass foundry and "battery" products, *i.e.*, pans, bowls, kettles and other hollow-ware, fashioned in those days (before the advent of stamps and presses), from sheet metal raised into shape by means of power driven tilt hammers giving upwards of 200 blows per minute and operating in a group (termed a "battery").

The introduction of stamped and spun pans, which could be produced more cheaply, caused the general decline in demand for the hammered (or "battery" produced) pan, but since the name was so well known in connection with the manufacture of other non-ferrous productions—*i.e.*, copper and brass tubes, sheets, etc.—the company—by this time possessing well-equipped rolling and tube mills both at Digbeth and Selly Oak—decided to retain the word "battery" in their title.

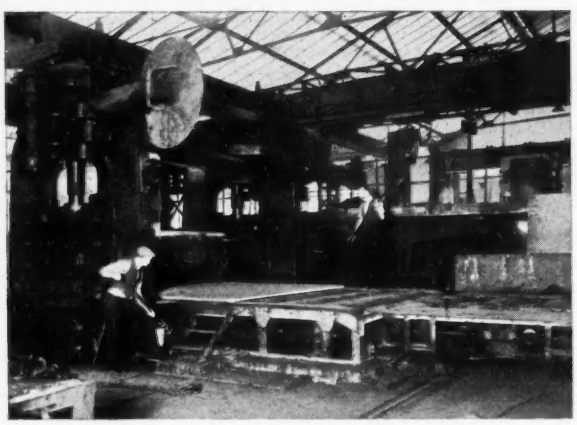
By 1837 the company, keeping abreast of the times, was able to supply lap-jointed boiler tubes to the earlier railway companies, and for many years it did a large trade in these and other tubes. In 1845 the company was registered as a joint stock company, and during the next few years the Gibbins family had bought out the other shareholders and so turned the company into a family concern.

In 1871 a new freehold works site at Selly Oak was bought, some buildings were erected and a canal basin was cut. Within twenty years the new works was gradually extended and the Digbeth works finally closed down. During that period, tube and rolling mills and a copper refinery were put into successful operation, and a rapidly growing trade was being done in solid drawn tubes, which had quickly taken the place of brazed ones for most purposes.

After the transfer to Selly Oak had been completed the firm was formed into a limited liability company, when William, Thomas and John Gibbins became the first directors. From that date enlargement of the works and improvement in plant and in methods of production were constantly taking place. Some of these changes were evolutionary common to industry generally, such as the substitution of gas engines for steam power, the provision of home-made electric supply, followed by the erection of a large plant supplying producer gas for power and heat, which in turn was discarded in favour of the City Electric Supply.

Along with general development, particular attention has been paid to the technical aspect of metal manufacture. A laboratory and a testing department was established, and this step resulted in important modifications of method, soon reflected in a generally improved quality of output. The technical aspect of production has been rightfully regarded as of vital importance.

During the great war, several additions of plant were made thus enabling the company to increase its already substantial



Hot Rolling Mill, showing 12ft. rolls

production. When peace was restored the company again proceeded with its policy of development, to meet the greatly changed conditions of the post-war period, especially in respect of the requirements for railways and electric supply undertakings. Heavy rolls, together with accessory machines for making large plates up to 12 ft. wide had been installed and the rod mill was recognised to increase the output of stay rods for loco boilers.

Amongst the new equipment is a large extrusion plant for the production of tubes and rods in various metals. The plant supplies the metal for the firm's subsidiary concern (Guests Brass Stamping Co.), a business acquired three years ago when the plant was removed from the centre of the City of Birmingham to Selly Oak.

Whilst these latter day changes have been taking place, changes in the directorate have also occurred, but without a break in the chain of family management. After sixty-seven years first as manager and then as chairman of the limited company, William Gibbins retired in 1923 from active participation in control, and the retirement of John Gibbins

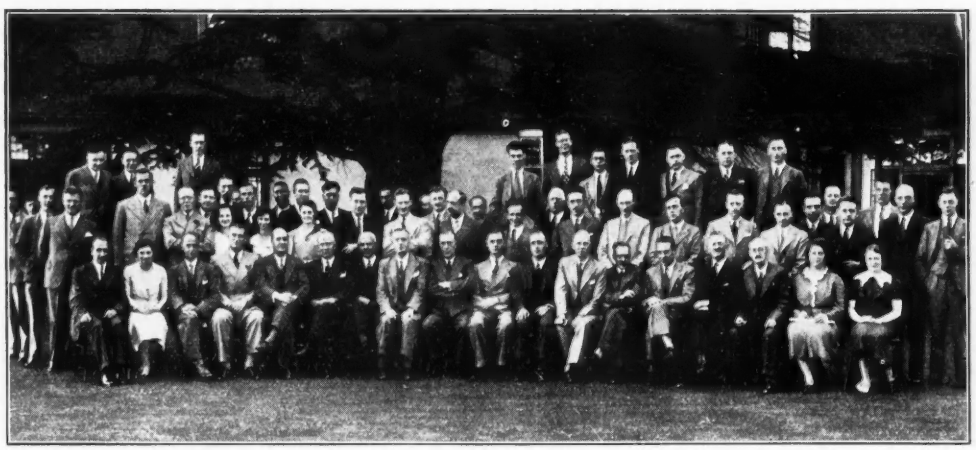
occurred in 1915, but younger members with some years of experience as directors were ready to take their places. W. Waterhouse Gibbins became chairman in 1923 and still retains the position, athough he retired from active management in 1925. During that year R. Lloyd Gibbins and Henry C. Gibbins were appointed managing directors, and the changes commenced another lengthy period of prosperity.

These three directors are all grandsons of the Thomas Gibbins who was appointed first manager of the company 100 years ago. Under their direction the company is maintaining its enviable reputation for the manufacture of non-ferrous goods, particularly tubes of large dimensions, big plates and rolled metal generally, to which may be added its successful entry into the hot brass stamping trade. Indeed, the position of the company to-day augurs well for the commencement of another lengthy period of prosperity.

Chemical Staff Conference at Sunbury

A New Wing for Anglo-Iranian Research Laboratories

WE are indebted to the Editor of "Naft," the house organ of the Anglo-Iranian Oil Co., for the loan of the accompanying photograph of the delegates who attended the eleventh annual conference of the chemical staff of the company from the various centres throughout the group, held at Sunbury last month. Representatives were present from head office, Iran, Llandarcy, Scotland and France, as well as from Sunbury itself. The occasion was honoured by the present of Sir John Cadman, chairman, who, before formally opening the conference, cut the first turf on the site of a new wing which is being provided as an extension to the research laboratories. This new wing will be devoted to the larger scale experimental work which must be carried out before conclusions reached in the laboratory can be placed on an industrial basis. The present addition is the first move in a general extension of the research station which is to be made in the near future.



Delegates to the Anglo-Iranian Oil Co.'s chemical conference photographed with the Chairman, and Production Department staff from Head Office and Sunbury, outside the Research Laboratories. The Chairman is seated in the centre of the front row (with arms folded)

The CHAIRMAN emphasised the importance of fundamental science and dwelt particularly on its relation to the problems of the petroleum industry. The research laboratories at Sunbury had been established to stimulate fundamental work within the framework of the industry and at the same time to provide for the application of such research work to the industry's problems. Some remarkable developments had thus come from the Sunbury laboratories and one needed only to look at the company's refineries to see the effect and influence of research work during the last few years. The company owed a great debt to its scientific workers, who had mastered the special characteristics of its crude oil and thereby helped materially to put the company in the strong position it now occupies.

Dr. DUNSTAN spoke of the growth of the laboratories from the time when the research department was housed in the basement at Meadhurst. In welcoming the delegates from other centres he stressed the importance of the conference as a means of providing that personal contact which was essential to the establishment of a community of purpose among the company's chemists. Commenting on the presence at the conference of members of the geological and production staffs in order that problems of common interest might be discussed, Dr. Dunstan remarked that this innovation might ultimately lead to the idea of a miniature "World Petroleum Congress" of the company's technical staff each year.

Mr. D. G. SMITH, speaking on behalf of Sunbury, stated that the staff there depended greatly upon meetings of this kind to enable them to get into contact with others directly connected with the practical business of producing marketable products. During the past year they had been concentrating at Sunbury on the development of processes which had previously been investigated on the research side, but it was essential that intensive research work should now be carried out to provide new material for development.

Brief speeches were also made by Mr. Reid, of Abadan; Mr. Thornton, of Llandarcy; Dr. Smith, on behalf of the Scottish delegates; and Mr. Cooke, representing the refineries in France.

Mr. G. H. COXON pointed out that they were responsible at head office for the selection of plant and processes for use in the company's refineries and they had to keep abreast of the latest developments from whatever source these emanated. In this respect the work done at Sunbury was not only necessary but vital to the company. While he admitted it was dangerous to prophesy, he felt they were heading for major changes in refining technique, and he believed they would see a great extension of the use of catalysts in connection with cracking treatment and hydrogenation.

New I.C.I. Dyestuffs

THIONOL BROWN RBS, a new product of Imperial Chemical Industries, Ltd., possesses very good level dyeing properties and is of particular interest for obtaining red-brown shades without the use of dyestuffs which are sensitive to alkali. It possesses very good fastness to washing, cross-dyeing and perspiration, whilst its fastness to milling and light may be classed as good. It is suitable for dyeing all types of cotton, linen, and viscose materials and, by virtue of the above mentioned fastness properties, is of particular interest for the dyeing of waterproof tent cloth materials, government drills, duck cloth, velvets, cords, warps for mohair linings and union gabardines. Thionol Brown RBS is also very suitable for application to materials which subsequently have to be rubber proofed as it withstands both heat and cold cure vulcanising treatments. It may be aftertreated with copper-bichrome in the manner usual for sulphur browns. The shade becomes somewhat yellower and duller, but light washing fastnesses are improved.

* * *

SOLACET FAST RED 3RS (patented) is a further member of the Solacet range of products for the dyeing of acetate rayon. These new dyestuffs, which are marketed in powder form, possess the outstanding property of being water soluble, the solubility of Solacet Fast Red 3RS being very good. This fast red is suitable for dyeing all forms of acetate rayon and possesses very good affinity for the fibre when dyed with the addition of common or Glauber's salt. It is of special interest for the dyeing of heavy crepe and material of similar texture, where good penetration is highly desirable, and the exhaustion can be controlled by the addition of salt to the dyebath, in a manner similar to that used when direct dyestuffs are applied to cotton. Solacet Fast Red 3RS may be applied in conjunction with the Duranol and Dispersol dyestuffs for the production of mode shades and with CR Chlorazol dyestuffs for the production of two-coloured effects on mixed fibres, provided that common or Glauber's salt is added to the dyebath; the Duranol and Dispersol dyestuffs being unaffected by these additions to the dyebath. Ground shades dyed on acetate rayon with Solacet Fast Red 3RS can be discharged to a good white by the Formosul-calcium (or zinc) sulphocyanide process. By virtue of its solubility, together with its freedom from marking off on steaming, this dyestuff is eminently suitable for direct printing on acetate rayon material as it yields regular and level results, especially in pale and mode shades

* * *

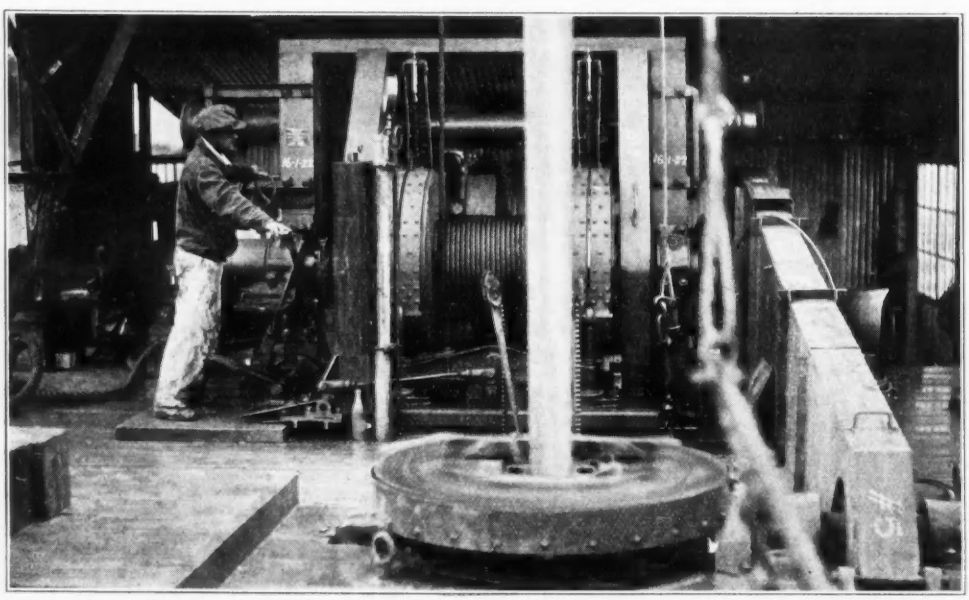
THIONOL DARK BROWN BS is particularly suitable for producing full dark brown shades on all types of cotton, linen and viscose materials. It requires no acetic rinse after dyeing to develop the shade, and does not lose its red tone when treated with alkalies. It possesses a very good washing, perspiration and cross-dying fastness and good light fastness and is of interest for the dyeing of waterproof tent cloth materials, government drills, duck cloth, velvets, cords, warps for mohair linings and union gabardines. It withstands vulcanising, by both heat and cold cure methods, and is thus of interest for the dyeing of materials which subsequently are to be rubber proofed. The solubility of Thionol Dark Brown BS is very good, and this, together with its very good level dyeing properties, renders it suitable for the dyeing of cops and cheeses in circulating machines. Aftertreatment with copper-bichrome results in a little improvement in the light fastness, the shade becoming a little duller.

* * *

CALEDON BLUE RNS yields shades brighter and slightly redder than those obtained by the use of the older and well-known brand, Caledon Blue RS. It is suitable for the dyeing of cotton and linen piece goods, cotton viscose union casements and furnishing materials which are required to be fast to light and washing, and for cotton and viscose yarns in those cases where chlorine bleaching fastness is not of importance. It is also suitable for the protection of light and medium shades on silk. CALEDON BRILLIANT BLUE RNS yields shades brighter and slightly redder than those obtained by the use of the older brand, Caledon Brilliant Blue RS.

Oil Drilling at Henfield

DRILLING commenced six weeks ago in the second of the Anglo-Iranian Oil Co.'s test wells in England, situated at Henfield, on the Horsham-Shoreham road. Good progress is being made and the well has already reached a depth of over 900 ft. The photograph, reproduced by the courtesy of "Naft," the staff magazine of the Anglo-Iranian Oil Co., shows the drilling in progress. The importance of the search for oil in England has been stressed by Sir John Cadman.



Cumarone Resins

A Book of Useful Data and Recipes

IN order to familiarise customers with the characteristics and properties of cumarone resins, Brown and Forth, Ltd., have thought it advisable to give more detailed information regarding their uses and possibilities, as well as a number of typical examples. Accordingly, they have published a book entitled "Cumarone Resins and Solvents" (pp. 46) to serve as a basis from which customers can evolve formulæ to suit their own requirements. In its early days cumarone resin, largely because of its price and lack of uniformity, was often regarded as "cheap and nasty." This is no longer the case, and its excellent qualities such as neutrality and chemical resistance, as well as its easy compatibility with drying oils and varnishes, are being more and more widely recognised. At the same time these qualities are accompanied by a cheapness in price which renders cumarone resins indispensable in every paint and varnish factory. They may be advantageously employed for mixing with the more expensive synthetic resins whereby cost prices can be notably reduced with little or no inferiority in quality.

I.C.I. Grass Drying Plant

A Demonstration in Scotland

A LARGE number of farmers attended a demonstration of an I.C.I. grass drying plant installed at the Strathallan estate of Sir James D. Roberts, Bt., last week and Mr. Ward, of Imperial Chemical Industries, Ltd., explained the process of drying.

This Billingham drier is constructed to deal with one ton of grass per hour, the grass containing anything up to 75 per cent. of water, whereas the dried product contains only 2 to 3 per cent. of moisture. It therefore takes some five tons of wet grass to produce one ton of the dried product. The grass is cut by a tractor-drawn mower and is immediately transported to the drier. A man and a boy operate the cutter and transport and they can cut sufficient in four hours to keep the drier working for a full day. Three men are needed to work the drier and baler.

The grass is dried in two stages. Spread out on wire-mesh trays it is put into the first oven, and then when taken out is forked and returned to the second oven. The completion of drying is registered by an indicator. The dried material is baled in lots of 90 to 100 lb., in order to economise space. It retains its fresh green colour and when well soaked with water again becomes like fresh grass.

Coal Tar Creosote

New British Standard Specification

THE British Standard Specification No. 144, entitled "Creosote for the Preservation of Timber," has been revised by the British Standards Institution Creosote Committee on which manufacturers, users and research workers are represented. Throughout the work the Committee has been in close contact with the Standards Association of Australia with the result that uniformity in the specifications and methods of test issued by the two countries has been achieved.

The chief alterations to the old specification are concerned with the methods of testing in which personal equation in manipulation and apparatus has been reduced to the minimum by adopting the procedure of the Standardisation of Tar Products Test Committee.

The specification includes three types of creosote, derived from the three main types of coal tar, and the inclusion of creosote from blast furnace tar is retained, while provision has now been made whereby those who wish to employ the oil from low temperature tar will have a standard specification on which to base their practice. Footnotes have been added whereby the specific gravity ranges may easily be converted to the fundamental units of density—that is, grams per millilitre—at 38° C., anticipating the hope that all British Standard Specifications for liquids in which specific gravity is given as a property will, in the course of time, show density figures instead.

Copies of this revised Specification (No. 144-1936) can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, S.W.1, price 2s. 2d. post free.

United States Mercury Industry

Advance Statistics for 1935

THE domestic mercury industry in the United States in 1935 was maintained at about the 1934 level. Increased domestic production was accompanied by a decline in imports of metal and consumption was at virtually the 1934 rate. The quoted price for mercury was slightly lower in 1935, although the average recorded for December closely approximated the highest monthly quotations for 1934.

As Italy and Spain are the largest mercury producing countries in the world, the war between Italy and Ethiopia, economic sanctions against Italy and internal disorders in Spain raised the question of possible difficulty in obtaining supplies of mercury and increased demand for the metal in the last quarter of 1935. Sixty per cent. of total imports into the United States were entered in the last quarter of the year. Italy's output of mercury in 1935 totalled 25,469 flasks, nearly double the production of 1934, but much below the level of years prior to 1933. Exports of mercury from Spain are reported to have about doubled in 1935.

As in earlier years, most of the mercury produced in the United States in 1935 came from a relatively small number of the larger mines. Of the 90 mines active in 1935, nine accounted for 77 per cent. of the total output. Seventy mines and prospects produced 1,359 flasks only, an average of 19 flasks to the mine.

Scale Deposits in Boiler Plant

Means for Rapid Removal

IT is an established fact that a boiler, freed from scale, has its efficiency increased by as much as 50 per cent. Furthermore, scale is injurious to metal, often unobserved, and if unchecked will continue its destructive process in the splendid privacy of its concealing layer.

The old method of chipping and scraping to remove scale is still adopted in many places. This method is not only harmful to the plant, but is very laborious, and often the scale is not entirely removed, leaving a splendid surface for more scale to form alternatively. The introduction of chemical compounds, which may be very efficient as scale removers, often attack the metal surfaces and different parts of the plant. An effective method of overcoming the scale problem, however, is found in the "Epheta" descaling process, which efficiently removes all scales, irrespective of their chemical content, and is absolutely harmless to the plant or any parts of machinery.

The "Epheta" process is claimed to be the last word in chemical descaling and offers many advantages over other chemical compounds. No mineralic acids are used in the manufacture of this scale remover, which dissolves all traces of scale without any part of the plant being dismantled. The process is simple in operation; no special apparatus being necessary. By observing the few simple instructions fully described in the manufacturers' literature, the process can be carried out under any condutions, and a perfect descaling job obtained. The manufacturers are the Epheta Chemical Co., Ltd.

The Chemical Age Lawn Tennis Tournament

Draws for Fourth Round and Semi-finals

TUESDAY of this week was the closing date for the third round matches in the sixth annual CHEMICAL AGE Lawn Tennis Tournament, but owing to the rainy season a number of the matches had to be postponed. In anticipation of these being played off this week-end, however, the draw for the fourth round of the singles and for the semi-finals of both the singles and doubles was completed at Bouverie House on Wednesday. All the fourth round and semi-final matches must be played off by August 31, in order that arrangements may be completed for the finals which, as announced last week, are to be played on the East Ham sports ground of the Gas Light and Coke Company on the afternoon of Saturday, September 12.

Third round results received during the week are as follows:

Singles.—A. W. A. Goudie (Tar Residuals, Ltd.) beat E. A. Thomsett (British Oxygen Co., Ltd.), 6—4, 7—5.

Doubles.—R. D. Hayman and C. G. Copp (Doulton and Co., Ltd.) beat F. R. O. Allen and R. A. J. Bennett (Nobel Chemical Finishes, Ltd.), 8—6, 6—1. V. J. Prosser and A. Baxter (John Haig and Co., Ltd., and United Yeast Co., Ltd.) beat G. J. Brewer and A. W. A. Goudie (British Celanese, Ltd., and Tar Residuals, Ltd.) 6—3, 7—5.

Results of the following third round singles matches were still outstanding at the time of going to press: Tickner, A., v. Bennett, R. A. J.; Cosgrove, A., v. Copp, C. G.

Details of the draws are given below. As usual, the first-named player or players will have the choice of ground, and all players are urged to arrange for their matches with the least possible delay. Competitors still in the tournament are as follows:

SINGLES

Baxter, A.
United Yeast Co., Ltd., 238, City Road, London, E.C.1. (Clerkenwell 0303.)

Bennett, R. A. J.
Nobel Chemical Finishes, Ltd., Wexham Road, Slough, Bucks. (Slough 528.)

Copp, C. G.
Doulton & Co., Ltd., Lambeth, S.E.1. (Reliance 1241.)

Cosgrove, A.
Hanovia, Ltd., Bath Road, Cippenham, Slough, Bucks. (Burnham (Bucks) 500.)

Goudie, A. W. A.
Tar Residuals, Ltd., 4, Lloyd's Avenue, E.C.3. (Mayfair 8000, Ext. 218.)

Gough, C. C.
Lever Bros., Ltd., C.T.D/G. Dept., Port Sunlight, Cheshire. (Rock Ferry 500.)

Grape, L. F.
Borax Consolidated, Ltd., Regis House, King William Street, E.C.4. (Mansion House 8332.)

Hanson, G. A.
Whiffen & Sons, Ltd., Carnwath Road, Fulham, S.W.6. (Fulham 0037.)

Tickner, A.
British Celanese, Ltd., Celanese House, Hanover Square, W.1. (Mayfair 8000, Ext. 137.)

Williams, R. M. O.
Chance & Hunt, Ltd., 5-7, St. Helen's Place, London, E.C.3. (National 4024, Ext. 7.)

DOUBLES

Gough, C. C., & Williams, T. P.
Lever Bros., Ltd., Port Sunlight, Cheshire. (Rock Ferry 500.)

Hayman, R. D., & Copp, C. G.
Doulton & Co., Ltd., Lambeth, S.E.1. (Reliance 1241.)

Prosser, V. J., & Baxter, A.
John Haig & Co., Ltd., 2, Pall Mall East, S.W.1, and United Yeast Co., Ltd., 238, City Road, E.C.1. (Whitehall 1040; Clerkenwell 0303.)

Willshere, A. E. C., & Grape, L. F.
Borax Consolidated, Ltd., Regis House, King William Street, London, E.C.4. (Mansion House 8332).

Details of the Draw

DOUBLES

Semi-Final.

(To be played by August 31)

Hayman, R. D., and Copp, C. G., v. Gough, C. C., and Williams, T. P.

Willshere, A. E. C., and Grape, L. F., v. Prosser, V. J., and Baxter, A.

SINGLES

Fourth Round and Semi-Final.

Fourth Round. (To be played at once)	Semi-Final. (To be played by August 31)
1. **Grape, L. F.** v. 2. **Baxter, A.**	1 or 2 v. 3 or 4 .....
3. **Cosgrove, A.**, or **Copp, C. G.** v. 4. **Hanson, G. A.**	
5. **Gough, C. C.** v. 6. **Williams, R. M. O.**	5 or 6 v. 7 or 8 .....
7. **Tickner, A.**, or **Bennett R. A. J.** v. 8. **Goudie, A. W. A.**	

Analysis of Fat

Standard Methods Published

THE British Standards Institution has just issued the English text of the standard methods for the analysis of fats prepared by the International Commission for the Study of Fats. It is hoped that the issue of these standards as agreed international standards will serve a useful purpose in the promotion of uniformity amongst nations.

The Chemical Divisional Council of the Institution has accepted responsibility for the British representation on the International Commission and a fully representative British National Committee has been constituted under the chairmanship of Mr. E. R. Bolton, who is also the British representative on the International Commission. This committee is working in close collaboration with the Society of Public Analysts and proposes to review the methods after one year in the light of any criticisms which may be received. Whatever modifications may be found necessary to render the methods acceptable to this country will be presented to the International Commission.

The methods of analysis published include moisture and volatile substances, impurities, ash, unsaponifiable matter, acidity, saponification value, iodine value, density and refractive index.

It is interesting to note that the International Commission is to meet in Lucerne on August 17, 18 and 20, and will have before it the new set of draft methods relating to the analysis of soaps. These methods are in course of preparation by the Commission, and the British Committee is actively co-operating in the work. A preliminary examination of the draft methods by British chemists has shown that they are not wholly acceptable, and will require important revision to render them suitable to British interests. Accordingly, steps are being taken to prepare recommendations in the form of alternatives where these are felt to be necessary and revisions and modifications where the basis of the methods has appeared to be acceptable.

It will not be possible to have these proposals ready for this year's meetings of the Commission, but it is hoped that by next year the British chemists will be in a position to present these recommendations. Copies of "Standard Methods for the Analysis of Fat" (No. 684-1936) are obtainable from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 3s. 8d. post free.

INVESTIGATIONS are being made as to the economics of developing a magnesium salts export industry in South Africa. In the Matzop Pan, Hay Division, Cape Province, about twenty miles south of the Posmasburg manganese deposits, a natural brine rich in magnesia can be readily pumped for treatment with accessible lime to yield precipitated magnesium oxide or carbonated to precipitated magnesium carbonate.

Structure and Molecular Force

A Discussion Organised by the Faraday Society

A GENERAL discussion on "Structure and Molecular Forces in (*a*) Pure Liquids and (*b*) Solutions" will be held by the Faraday Society in the Chemistry Theatre, University of Edinburgh, September 24 to 26, 1936. The scope of this meeting does not extent to kinetics, which will form the subject of a forthcoming meeting, and is not intended to extend to subjects which have been the subject of recent meetings, *e.g.*, dipole moments and the theory of strong electrolytes.

The general introduction will be given by Professor J. Kendall (Edinburgh). Contributions to Section A (Structure and Molecular Forces in Pure Liquids) will include an introductory paper ("The General Theory of Molecular Forces") by Professor F. London (Oxford), Dr. J. D. Bernal (Cambridge) on "An Attempt at a Molecular Theory of Liquids," Professor J. Errera (Brussels) on "Structure of Liquids and Liquid Mixtures Studied in the Infra-Red," Professor A. Eucken (Göttingen) on "Investigations of the Specific Heat of C_v of Simple Fluids Throughout Their Whole Temperature Range," Dr. J. Frenken (Leningrad) on "The Liquid State and Theory of Fusion," Dr. J. T. Randall (Middlesex) on "The Structure of Liquids: A Survey of the Evidence from X-Ray Diffraction," Dr. J. T. Randall and Mr. H. P. Rooksby (Middlesex) on "The Identity of Structure in Liquid Lead and Bismuth," and Dr. A. G. Ward (Cambridge) on "The Viscosity of Pure Liquids." The title of a contribution by Professor E. N. da C. Andrade (London) has not yet been announced.

In Section B (Structure and Molecular Forces in Solutions) there will be an introductory paper by Professor J. H. Hildebrand (Berkeley, Cal.) with Dr. P. S. Albright and Professor J W. Williams (Wisconsin) on "Electrical Forces Between Ions and Neutral Molecules in Solution," Dr. R. P. Bell (Oxford) on "The Entropy of Solution of Gases," Dr. A. E. Brodsky (Dnepropetrovsk) on "Refractometric Curves and the State of Dissolved Electrolytes," Dr. J. A. V. Butler (Edinburgh) on "Molecular Interaction in Aqueous Solutions," Dr. S. Glasstone (Sheffield) on "The Structure of Some Molecular Compounds in Solution," Dr. E. A. Guggenheim (Reading) on "Conditions for the Validity of Raoult's Law," Dr. A. R. Martin (London) on "The Benzene Solutions of Polar Substances," Professor M. Polanyi and Dr. M. G. Evans (Manchester) on "The Laws of Solubility," Dr. H. Sack (Brussels) on "Absorption of Ultrasonic Waves in Liquid Mixtures," Professor G. Scatchard (Cambridge, Mass.) on "Change of Volume on Mixing and the Equations for Non-Electrolyte Mixtures," and Professor L. Wolf (Kiel) on "Heats of Mixing, Immiscibility and Association."

In addition to the overseas workers already mentioned, Dr. H. Hellmann (Moscow) and Dr. P. Gross (Wien) hope to be present and to contribute to the discussion.

Chemical Matters in Parliament

Gasholders (Safety Precautions)

IN the House of Commons on July 31, Mr. White asked the Home Secretary how many complaints had been received by his department as to the non-observance of precautions in the inspection and repair of water-sealed gasholders; and what action had been taken?

In reply, Mr. Lloyd said that during the past eight years ten complaints as to the condition of water-sealed gasholders appeared to have been received. These were duly dealt with. Further, the Department had taken up as regards the country generally the questions of inspection and of precautions in connection with repair, and had discussed these matters with the Institution of Gas Engineers. Recommendations as to methods of examination were circulated by the Institution and these were now under revision in the light of experience.

Storage of Petrol

A New Transfer of Licences Act

THE Petroleum (Transfer of Licences) Act, 1936, which has just become operative, should be noted by the owners and renters of all premises storing petrol. By the Petroleum (Consolidation) Act, 1928, no petroleum spirit (meaning petroleum which on tests laid down in the Act gives off an inflammable vapour at a temperature of less than 73° F.) can be kept without a licence, that is, in greater quantities than a total of 3 gal., either for sale or for private use ordinarily, except spirit stored for use in motor vehicles, boats or aircraft and for small matters of domestic or agricultural purposes. For these exceptions a quantity up to 60 gal. (petrol in fuel tanks, motor cars, etc., included) may be kept without a licence providing that certain conditions laid down in regulations are observed. These conditions, however, do not apply if a licence for storage is applied for. The fees for a new licence are as follows:—Up to 100 gal., 5s.; over 100 and up to 500 gal., 10s.; over 500 and up to 1,000 gal., 15s.; over 1,000 and up to 5,000 gal., £1; over 5,000 and up to 10,000 gal., £2; up to 50,000 gal., £4. The reason for the new Act is that a defect in the law has been found whereby on a change of occupancy, a transfer could not legally be made; to be legal a new licence was required with all the accompanying procedure and expense, and any transfer already made had no effect in law. This new Act, therefore, lays down that a transfer can be made by endorsment of the licence or otherwise. Then for all purposes the transferee takes the place of the former holder, that person ceasing to have any further authority under the licence. Moreover, the Act is made operative both retrospectively and currently, and therefore any transfers already made are so made legal. From the commencement of the Act (July 14, 1936) the fee payable for a transfer is 2s. 6d. The licensing body is the local council; if in the City of London, the Common Council; if outside, but within the County of London, the London County Council, or in certain cases the Home Secretary may function.

Fashion Colours for Autumn and Winter

British Colour Council Display

A DISPLAY of fashion colours for autumn and winter, held by the British Colour Council, at its offices in Sackville Street, London, last week, indicates a trend to more subdued and low-toned shades. This trend is attributed to the national restrain against bright colours and the influence of the recent Chinese exhibition. The autumn colour chart issued by the Council is, therefore, mainly remarkable for its curious low-toned hues and unusual combinations of colour. One of the new coppery rust shades, a rich brownish red, is named "Murrey," a fourteenth century word only found in connection with heraldry, which the Council has resurrected for popular use. Greens are in the forefront of fashion, predominating colours being known as Chou Green, of Chinese inspiration, and Lomond Green, a lighter shade, gaily contrasted with Hunting Gold for sports wear. A softer version of green is Sung Green, which dyes well on soft Yorkshire wools and is introduced with natural colour in Scotch tweeds.

Many new shades of blue and red are to be popular under the names of Squadron Blue, Harrow Blue, Lancer Red and Bacchus Red. Phoenix Blue and Moon Grey are designed for more exclusive wear and blend well with Clove Pink and Chinese Cloud. Velvet dyed to a rich copper red is called Copperleaf, while the faded pinks are shown in Bronze Rose and Clover Pink.

A prominent feature of the display was the introduction of Angora and feathers in the production of the wools to obtain extraordinary lightness with warmth.

New Technical Books

FABRICATION VON ABSOLUTEM ALKOHOL ZWECKS VERWENDUNG ALS ZUSATZMITTEL ZU MOTOR-TREIBSTOFFEN. By M. Klar. Halle (Saale): Verlag von Wilhelm Knapp. Pp. 84. RM. 4.20.

When petroleum spirit or benzole is blended with alcohol so that not more than 25 to 30 per cent. of the latter is present in the mixture, the result is a spirit in no way inferior to petrol or benzole alone, while the alcohol in addition functions as an anti-knock agent. The vast additional field for the alcohol-producing industry thus opened up in recent years has led to production of 99.6 to 99.8 per cent. alcohol (any trace of water is fatal to the efficiency of alcohol-blended spirit) on a scale which would have been considered fantastic not very many years back. This little monograph will appeal to the limited number of chemists, technical managers and executives engaged in absolute alcohol manufacture—a branch of chemical technology requiring exceptional resources for its successful operation. As the title implies, its subject matter is confined strictly to the large-scale production of absolute alcohol and the biggest chapter is accordingly that devoted to dehydration by the azeotropic methods.

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COLLECTED SCIENTIFIC PAPERS OF SIR WILLIAM BATE HARDY. Published under the auspices of the Colloid Committee of the Faraday Society. Cambridge, The University Press. 1936. Pp. vi + 922. 63s.

At intervals there appears a scientific worker of rare insight whose investigations become internationally recognised as classical, even in his own lifetime. Such a man was Hardy. Physicists, physical chemists and biologists must be indebted to the Faraday Society and to Professor E. K. Rideal, the editor of the book, for collecting in one volume the many important papers published by Hardy. The book itself has been admirably executed and will grace the shelves of any library. "Hardy once observed a cell divide under a microscope, and wondered why . . ." so said one who knew him well. His curiosity led him to explore interfaces, so to enrich our knowledge of biological systems, colloidal solutions (especially proteins), the nature of the electric charge on particles dispersed in media, surface tension, and lubrication phenomena. The 59 papers now reproduced cover a very wide range of inquiry and reflect the versatility of the man. From histology to cell migration, the structure of protoplasm to proteins and the general theory of colloidal solutions, we are taken to the tension of composite fluid surfaces and the spreading of fluids on water and solids, so leading to problems of the boundary state. During this survey we meet Hardy's other work on the mechanism of gelation, an application of the principle of dynamical similitude to molecular physics, the freezing of gels and the yolk and white of eggs, and free and bound liquid in gels. In all he touched upon Hardy left his mark. The fundamentally important work of Harkins and Langmuir, followed by the equally important results of Adam, Rideal and many others on molecular orientation at interfaces was explicitly foreshadowed by Hardy in his 1913 paper: "The Influence of Chemical Constitution upon Interfacial Tension." In a now very famous passage he stated: "If the fields of force about a molecule are not symmetrical, that is to say, if the equipotential surfaces do not form spheres about the centre of mass, the arrangement of the molecules of a pure fluid must be different at the surface from the purely random disposition which obtains on the average in the interior. The inwardly directed attractive force along the normal to the surface will orientate the molecules there. The surface film must therefore have a characteristic molecular architecture, and the condition of minimal potential involves two terms, one relating to the variation of density, the other to the orientation of the fields of force." Altogether, to re-read Hardy in this beautiful volume is a duty as well as a pleasure. —WILLIAM CLAYTON.

DIRECTORY OF PAPER MAKERS OF GREAT BRITAIN AND IRELAND, 1936. Marchant Singer and Co. 5s. 6d. net.

This 1936 edition has been thoroughly revised and brought up to date in all its various sections. Many new additions have been made in the trade designations, also numerous withdrawals and transfers of names in both actual watermarks and trade names. Of particular interest is the special article "The Past Year in the Paper Trade," reviewing the position of the paper trade and important events concerning mills. In addition to particulars of the paper mills, etc., there is a list of china clay producers and merchants.

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CORROSION RESISTANCE OF METALS AND ALLOYS. By Robert J. McKay and Robert Worthington. Pp. 492. New York: Reinhold Publishing Corporation; London: Chapman and Hall Ltd. 35s. net.

The purpose of this book is to summarise the facts on corrosion processes and rates. The data presented mostly covers the facts only; it offers no detailed advice on corrosion difficulties. Cure in the majority of cases is effected by using the right alloy in the right place, and in the present state of our knowledge of non-ferrous alloy corrosion it is not possible to give any general methods of prevention. Here, however, is a book which gives a wealth of information which has been gathered from widely different sources, and sifted and presented in a readable manner. Divided into two sections, the first part of the book treats of rate factors, forms of corrosion, corrosives and metal corroding properties; the second part discusses the corrosion behaviour of specific metal and alloy groups. As usual with the American Chemical Society Monographs, of which this book is one, the general appearance and subject treatment leave little to be desired, reliable bibliographies at the end of each chapter and full author and subject indices being one of its minor commendable features.

* * *

DICTIONARY OF ORGANIC COMPOUNDS. Edited by J. M. Heilbron, H. M. Bunbury and others. Vol. 1. Abietic Acid —Dypnone. Pp. 706. Eyre and Spottiswoode. 105s. net.

The growth of organic chemistry during the past half-century has proceeded with such remarkable rapidity, and the output of research is to-day so immense, that the research in the reference literature for data concerning any specific compound is frequently both a lengthy and difficult undertaking. This dictionary, which is the only one of its kind in the English language, aims at providing a concise, up-to-date, but at the same time adequate, work of reference in which the subject matter is presented in a readily accessible form for all general purposes. It has been designed to meet the general requirements both of academic research workers and of those engaged in the various branches of the organic chemical industry. A careful method of selection has been adopted in order to avoid the inclusion of matter either relatively unimportant or of a highly specialised nature for the introduction of such material would retard publication to such a degree that certain of the information and data would inevitably be out of date by the time it was published. Dyestuffs as a class have been omitted, since their vast number, and the paucity of physical and chemical data concerning most of them, render their inclusion undesirable in a work of this scope, and moreover, they are adequately dealt with in specific treatises such as the "Colour Index." Organic bodies known to be mixtures, such as oils, fats, gums, etc., are also omitted. An alphabetical system of arrangement has been adopted, as this unquestionably provides the readiest method of access to a general work of reference. Every effort had also been made to increase utility and minimise delay in use by the inclusion of a sufficiency of cross-references. Another feature which will render it additionally attractive, both to the specialist and to the non-technical reader, is the introduction of the full formula of each compound and the citation in most cases of the exact page on which it is described in the original literature.

Chemical Notes from Foreign Sources

Belgium

A SUM OF ONE MILLION FRANCS has been allocated for a campaign to stamp out the Colorado beetle which has now overrun the entire country.

Indochina

STATEMENTS MADE AT THE GENERAL MEETINGS of three leading French rubber planting companies, Plantations de Terres Rouges, Compagnie de Cambodge and Plantations de Kratie, show that it was found possible to extend the area under rubber cultivation in the past year. The quota of 30,000 tons allocated for Indochina has not yet been reached, although an excess of about 8,000 tons is anticipated in the present year.

Hungary

THE CHEMISCHE FABRIK TERRACHEMIA has been formed in Budapest, with a capital of 300,000 pengo, to engage in the production of bleaching earths from raw material derived from the Nagytetenyer deposits of the Ungarische Bergbeu A.G. Firms participating in the new enterprise are the Hungaria Kunstdünger A.G., the Ungarische Bergbau A.G., and the A.G. für industrielle Explosivstoffe.

Switzerland

JOINING IN THE WORLD-WIDE SEARCH foi new sources of petroleum prospecting work has now been initiated in Switzerland, exploratory drilling operations having recently started near Cuarny in the canton of Vaud, a district already known for its natural gas wells. If necessary, drilling will be continued down to a depth of over 6,000 feet and the work will be part of a comprehensive programme extending throughout the cantons of Vaud and Neuchatel under the auspices of the Société Neuchavaud, a company specially formed for this purpose by Belgian and Swiss interests.

Italy

THE STATE-SUBSIDISED HYDROGENATION COMPANY, S.A. Azienda Nazionale Idrogenazione Combustibili, the formation of which was recently announced, is planning the construction of three large hydrogenation plants located at Bari, Livorno and Florence.

A LARGE MEASURE OF STATE CONTROL of the Italian coal hydrogenation industry will be ensured by a recent decree, empowering the Azienda Italiana Petroli Albania (A.I.P.A.) and the Azienda Generale Italiana Petroli (both of which are controlled by the Italian State Railways) to take up 100 million lire of share capital in the recently founded S.A. Azienda Nazionale Idrogenazione Combustibili. It is planned to raise the capital of the hydrogenating company (originally 500,000 lire) to 400 million lire.

Japan

SEVERAL NEWCOMERS TO THE JAPANESE COAL HYDROGENATION FIELD are mentioned in "Chemische Industrie," August 1. With a capital of 12.5 million yen the Daini Ube Chisso Kogyo K.K. has been formed under the auspices of the Ube Chisso Kogyo K.K. It is intended to merge the two companies in 1937 to form Japan's largest hydrogenation enterprise with a capital of 30 million yen at its disposal. A new coal liquefaction plant operating a special process is being built by Chosen Sekitan Kogyo K.K. at a cost of 10 million yen. When the first unit is started next June, oil will be produced at the annual rate of 50,000 tons, but it is planned to increase the production to a maximum of 150,000 tons per annum. The main plant of the coal liquefaction company, which, as already reported, is being formed by the Mitsui concern, will be located in Hokkaido and will operate with a capital of 20 million yen to be increased later to 50 million yen.

Jugoslavia

ACCORDING TO A PRESS REPORT, C. M. and A. Pogacnik are building a modern factory for production of hydrogen peroxide at Podnarat, near Gorensku.

PRODUCTION OF PORTLAND CEMENT, bauxite cement and phosphate fertilisers is to be undertaken by the Dinara company at a new factory in Sibenik.

Greece

PLANS FOR INTENSIFIED EXPLOITATION of the bauxite deposits in various parts of the country are being put in hand with the aid of foreign capital, reports the "Chemische Industrie" of July 18. At present, bauxite deposits are being worked by three companies (Bauxite Barlos Frères, Bauxite Société Parnasse and Société Bauxite Delphi) on the north coast of the Gulf of Corinth and on the island of Amorgos.

France

A NEW PROCESS FOR PREPARING BLANC FIXE from barytes is based according to G. Vie ("L'Industrie Chimique," July, 1936, page 499) on the solvent action of certain salts in the melted condition for barium sulphate. On adding barytes to a bath of the liquid salt the barium sulphate present in the mineral disssolves up rapidly whie the impurities such as silica, chalk and magnesia can be separated. The transparent mass comprising the solution of barium sulphate is subsequently treated with water under such conditions that the salt used as the solvent immediately goes into solution while the barium sulphate settles out in the form of a white mud. Six batches or more can be put through the treatment daily which comprises fusing of the salt, disolving the barytes, refining the melted mass and, finally, running off the mud. The precipitated blanc fixe is washed and passed through filter presses to yield a paste containing 70 to 75 per cent. barium sulphate. It can be transformed into powder by drying and grinding the material coming from the filter presses. Rock salt is recommended as the solvent in the first stage, since apart from its excellent solvent action upon barytes and its cheapness, an extremely pure brine can be obtained as a by-product.

Germany

THE DYNAMIT-A.G. VORM. ALFRED NOBEL AND CO., the explosives and plastics manufacturing concern of Troisdorf, which is associated with the I. G. Farbenindustrie, have declared a dividend of 3½ per cent. for 1935.

GERMAN CRUDE OIL PRODUCTION for the first half of 1936 was maintained at approximately the same level as in the previous year, the respective figures being 215,000 tons and 218,600 tons. For the corresponding period of 1934 the production only amounted to 133,000 tons.

THE DEUTSCHE BERGIN A.G. FUR HOLZHYDROLYSE announces, in its report for 1935, the impending commencement of regular production at the Rheinau wood saccharification works. Since no production was possible during the period of construction the year closed with a loss of 120,000 marks, which with the previous year's loss makes a total loss of 215,000 marks.

IN ITS REPORT FOR 1935 the J. D. Riedel-E. de Haen A.G., of Berlin, announces a net profit of 252,000 marks as against 213,000 marks in the previous year of which 189,000 marks has been transferred to the statutory reserve fund. No dividend is being distributed. Home trade in technical chemicals continued to improve, but pharmaceuticals were disappointing.

SOLID FUEL IN A STABLE FORM can be prepared (according to Ger. Pat. 626,939) by treating petroleum spirit with a mixture of soap, pyridinised alcohol and beeswax. The wax is first dissolved in the spirit, a small proportion of xylol is then added and the product then mixed at an elevated tem-

perature with a concentrated solution of soap in the denatured alcohol. On cooling, a jelly is formed which burns with scarcely any residue and is not explosive.

FIRMS OPERATING THE ELOXAL PROCESS for electrolytic oxidation of aluminium are pooling their patent rights and are also acquiring rights in foreign owned patents. Development on the Continent will thus be ensured of such processes as the Bengough process for colouring anodically oxidised surfaces. Participants in the arrangement will derive benefit from the technical experience gained with different plants which will be placed at their disposal. German licensees are estimated to have treated 2,000 tons aluminium in 1935.

Russia

AN EXPERIMENTAL PLANT FOR METALLIC ANTIMONY is being started up at the Kadamdschaistroi Combinate in Usbekistan.

WASTE PRODUCTS FROM THE ZINC SMELTING WORKS at Constantinowka are to be worked up in a special department, with the principal object of recovering zinc oxide and copper sulphate.

A PLANT FOR SUBTERRANEAN GASIFICATION OF PETROLEUM has been started up in the Grosny field, compressed air at a temperature of 650° C. being forced down to a depth of 1,400 feet. Two further installations on the same lines are being installed in the same area.

DESCRIBING A PROCESS FOR THE DIRECT CHLORINATION of phthalic acid to the tetrachloro derivative, Salkind and Belikowa ("J. Prikl. Khim.," *8*, (7) 1210) state that iron is a suitable catalyst. To purify the black, crude product, it is well mixed in the powdered form with hot water and fairly concentrated alkaline carbonate and the mixture heated on the water bath to dissolve the acid. Ferric hydroxide is removed by filtration and the filtrate extracted 2 or 3 times with hot water, using 8 to 9 litres water for each kilogram acid. The solution is gradually acidified with hydrochloric acid while shaking vigorously, when a fine precipitate of pure tetrachlorophthalic acid containing one molecule of water of crystallisation is formed in 90 to 95 per cent. yield. Heating just below 100° C. liberates the water of crystallisation and water of constitution is split off at 110° C.

Manchukuo

WORK IS SHORTLY TO COMMENCE upon the projected liquefaction plant of the South Manchurian Railway Co., the cost of which has been estimated at 15 million yen. The process to be worked has been developed after 8 years' collaboration between the company and the Japanese Marine Fuel Department. Work is also due to commence upon the construction of the new aluminium works which will likewise cost 15 million yen and will be capable of an annual production capacity of 3,600 tons of aluminium.

Personal Notes

Mr. J. W. NAPIER, engineer and manager of the Alloa Gas Department, has been elected chairman of the Glasgow Section of the Society of Chemical Industry.

Mr. H. L. KENWARD, general sales director of the Dunlop Rubber Co., Ltd., has just completed twenty-five years' service with the company. The staff under his control recently entertained him to dinner at Birmingham.

Mr. ARNO C. FIELDNER has been appointed as chief of the technologic branch of the United States Bureau of Mines. He succeeds Mr. O. P. Hood, who recently retired after a long period of service. Coincident with the appointment of Mr. Fieldner, the Bureau's technologic branch is being reorganised. The name of the mechanical division is changed to the coal division and studies relating to the use of electrical and mechanical equipment in mines are transferred to the mining division. The experiment stations division is discontinued, and the coal preparation section of the experiment stations division and the experimental mine section of the office of the chief mining engineer are transferred to the coal division. A new non-metals division is created to take over certain technical sections of the discontinued experiment stations.

Mr. JOHN STRATHERN ALLAN, starch manufacturer and company director, The Moorings, Thornly Park Avenue, Paisley, left estate valued £69,520.

Mr. ERNEST W. JONES, director and chief chemist of John Nicholson and Sons, Ltd., Hunslet, died suddenly at his residence, "Rosemead," Scott Hall Road, Moortown, Leeds, on July 28, following a seizure.

MR. FRANK MERRICKS, of 47 Horton Street, Kensington, London, W., consulting mining engineer, left estate of the gross value of £21,990 (net personalty £21,670). He left £2,000 (subject to a life interest) to the Imperial College of Science and Technology, South Kensington, upon trust for the benefit and advancement of Associates of the Royal School of Mines, and 1/10th of the ultimate residue to the capital account of the Benevolent Fund of the Institution of Mining and Metallurgy.

Mr. JOHANNES NICOLAAS SLUYTER, who was employed in the margarine industry at Aberdeen, died suddenly at his home, 128 Huntly Street, Aberdeen, on July 28, in his 67th year. He was a native of Amsterdam, and was employed in the margarine-making trade in Holland as a youth. In 1910 went to Aberdeen to join the firm of George Mellis and Son, Ltd.

Chemical and Allied Stocks and Shares

THE stock and share markets have continued to show a good deal of activity despite holiday influences. Imperial Chemical Industries were steady at 39s. 6d. and the deferred shares held up well at 9s. 7½d. It is being pointed out in the market that on the basis of the proposed merging of the deferred shares into ordinary shares, the deferred are relatively rather the cheaper purchase at the prices now ruling. The final decision as to the scheme for simplifying the company's capital structure is to be effected is not expected to be made known until October, and it is not believed in the market that the interim dividend on the ordinary shares will be announced until then. B. Laporte have been more active and are higher on balance for the week at 128s. 9d. For the year to March 31 last the company showed a further increase in its net profits from £61,604 to £67,246, and in addition to the raising of the dividend from 20 per cent. to 22½ per cent. there was also a share bonus of 10 per cent. The assumption in the market is that the payment of a share bonus in addition to a dividend is likely to be continued and that there may be the possibility as time proceeds of shareholders having the offer of additional shares on favourable terms. The 10s. shares of Lawes Chemical were around 8s. 6d., but they are held firmly, awaiting the forthcoming results. British Industrial Plastics' 2s. shares have again been active around 4s. on the belief that a larger dividend is likely. Blythe Colour Works' 4s. shares held up well at around 13s. 6d. on the interim dividend which has increased hopes that a good total dividend is in prospect for the year. British Glues were more active around 7s. 6d. The disposition in the market is to budget for an increased dividend for the current year. It is realised that the directors invariably follow a conservative policy, but the assumption is that the upward movement in profits is probably continuing. William Blythe 3s. shares were not very active, but they changed hands at 6s. 9d. This is another company which is said in the market to have reasonably good prospects of being

able to pay a larger dividend. Fison, Packard and Prentice continued more active on current dividend estimates in the market. Imperial Smelting Corporation were steady at 17s., Goodlass Wall and Lead Industries' 10s. ordinary shares were again rather dull at 12s. 6d. These shares have not been particularly active since the annual meeting in May because the statements made then tended to emphasise that, apart from the company's large home business, it does a considerable business abroad, and it is felt in the market that until the conditions for international trade are less difficult the directors may not decide to make any marked increase in the dividend. United Molasses were in larger demand and have risen on the week from 23s. 4½d. to around 24s., aided by the belief that the recovery in the company's profits is continuing and that a favourable increase in dividend is likely. Distillers were more active and higher at 104s. 10½d. Monsanto Chemicals 5½ per cent. preference shares were more active and rather higher at 24s. Unilever came in for some profit-taking following their recent good rise and there has been a decline of 9d. on the week to 35s. 3d. United Premier Oil and Cake 5s. ordinary shares continued in steady demand and are 4½d. higher on the week at 11s. 10½d., but the 12½ per cent. preferred ordinary units of British Oil and Cake Mills were unchanged at 49s. 4½d. International Nickel were good, aided by confirmation of expectations of a larger quarterly dividend and by the firmness of New York markets. International Combustion were steady on continued hopes of a possible increase in the dividend to 25 per cent. Cannon Iron Foundries 10s. shares were well maintained at 22s. and showed firmness, there being expectations in the market of an increase in the rate of dividend, particularly as the payment of an interim dividend has already been initiated. Greeff Chemical Holdings 5s. ordinary kept around 9s. 3d. and the 10s. preference shares moved up from 11s. 4½d. to 11s. 7½d. Cooper, McDougall and Robertson were better in common with various other shares for companies with business interests in the Argentine, there being hopes that economic conditions in that country may benefit a good deal if higher wheat prices continue.

From Week to Week

THE IRAK PETROLEUM PIPE-LINE in the Trans-Jordan territory was cut by Arabs on July 31, and the gushing oil set on fire at a point just across the River Jordan.

FOR THE JUNE QUARTER £538 was subscribed to infirmaries and charitable institutions in Glasgow and the West of Scotland by the staff and workers at Ardeer Factory and Nobel House, including the research department.

FIVE PEOPLE ARE KNOWN TO HAVE BEEN KILLED and a number injured, some seriously, by an explosion in a dynamite factory belonging to a private company at Orbetello, Italy, on August 4. It is feared that other victims of the explosion are pinned under the debris of buildings that collapsed. The cause of the explosion, as usual, is "unknown."

THE BEDE METAL AND CHEMICAL CO., LTD., Hebburn-on-Tyne, is making extensions to its works for the production of pulverised fuel. The works were established about 1860 and produce 1,500 tons of iron ore weekly and large quantities of copper in ingots, anodes and cakes and in addition gold and silver are extracted from ore imported from Spain and Norway. The works employ about 260 men.

FROM THEIR RECENTLY INSTALLED COKE OVEN PLANT William Dixon, Ltd., of Govan Ironworks, Glasgow, are now producing 2,000 gallons daily of motor spirit, certified to be fit for inclusion in benzol mixture. The amount can be increased to 800,000 gallons per year. It is estimated that 6,000,000 cu. ft. of gas can be available for domestic and industrial consumption as a by-product.

THE "ESSO" VISCOSITY-TEMPERATURE CHART, which has been introduced by A. Gallenkamp and Co., Ltd., to meet the long-felt need for an accurate means of conversion between different viscosity systems at different temperatures, will enable petroleum and tar technologists, or salesmen, to find the viscosity of any given oil in any system of units when they know the figures in one system at two different temperatures.

A FURTHER FIVE PROSPECTING LICENCES under the Petroleum (Production) Act, 1934, and the Petroleum (Production) Regulations, 1935, have been issued by the Board of Trade. The licences, one of which embraces two areas, have been granted to the Anglo-American Oil Co., Ltd., and cover approximately 478 square miles in the counties of Sussex and Hampshire. A map showing the areas for which licences have been issued can be inspected on application to the Petroleum Department, Mines Department, Dean Stanley Street, London, S.W.1.

THE IMPERIAL INSTITUTE ADVISORY COMMITTEE ON TIMBERS has been informed by the London County Council that two more Empire timbers submitted to that body by the Committee have been approved as fire-resisting materials which can now be used as building components under conditions applicable to oak, teak, jarrah, karri and other hardwoods. The two are Douglas fir from British Columbia and keruing from Malaya. Samples of the woods approved may be seen by those interested at the Imperial Institute, South Kensington, London, S.W.7, where information regarding them may also be obtained.

THE HOME SECRETARY HAS ISSUED AN ORDER making manganese poisoning in factories and workshops a notifiable disease. The object, states the Factory Department of the Home Office, is to give the factory inspectors a clue to dangerous conditions over which they can exercise control. The crushing, grinding, and sieving of ores containing manganese dioxide expose workers to dust, and it is from these processes that the majority of cases of manganese poisoning have arisen. Manganese dioxide is used extensively in the manufacture of dry batteries and in the manufacture of glass. It has been stated that the smelting of iron ore containing considerable quantities of manganese may give rise to cases among furnace-workers.

THE BEET SUGAR FACTORY AT PRESTONHALL, Cupar, is to resume refining operations and it is estimated that work will continue until the end of August giving employment to about 150 men.

REPORTS HAVE BEEN RECEIVED of potentially rich strikes of minerals in Northern Rhodesia. The latest is that a tin-bearing deposit with a possible commercial value has been discovered within the boundaries of Luiri Gold Areas.

THE BRITISH-OWNED THARSIS MINE, in the Huelva district of Spain, was occupied by the so-called "rebels," without disorder on Thursday. It is stated that the rebels have re-opened the mine and that work has now started again. In the same district the British-owned Rio Tinto mines are still in Government hands.

AN ACUTE SHORTAGE OF COKE for industrial purposes is responsible for a further advance in furnace coke in South Yorkshire. This week the coke was quoted at 24s. per ton at coke works, 3s. per ton more than the price fixed about a month ago. Supplies are scarce because of the very busy state of the heavy industries which are consuming every ton of coke as soon as it is delivered.

FLOODING HAS DELAYED WORK on the seaweed factory at South Uist. About twenty men have been engaged in laying the foundation for some weeks. A reef of peat was struck below the sand and so much water poured into the foundations that work was slowed up until an engine was secured to pump it out. Mr. J. Graham, who is in charge of the work, hopes that the building will be completed in the late autumn.

THE WORKS of I.C.I. Metals, Ltd., at Witton and elsewhere in the Birmingham district will remain closed until August 10 for the annual holiday. All workpeople with over twelve months' service receive full wages and those with six months' service have half pay. I.C.I. employees in the chemical works also have similar holidays with pay, but the chemical works do not close for a week at a time as do the metal works.

THE CONTROL OF THE TELLUS A.G. SUAR BERGEAU (Germany) has been sold by the banking house of Strauss and Co. to the Harburger Chemische Werke Schon and Co. The greater part of the latter company's capital of Rm.1,000,000 is held by the Goodlass Wall and Lead Industries, Ltd. The Tellus Co. was reorganised in 1924, the capital being reduced from Rm.3,900,000 to Rm.500,000. It is a holding company and controls the lead industry in Frankfort.

Latest Oil Prices

LONDON, Aug. 5.—LINSEED OIL was steady. Spot, £29 10s. (small quantities); Aug., £27 2s. 6d.; Sept.-Dec. and Jan.-April, £27 5s., naked. SOYA BEAN OIL was steady. Oriental (bulk) spot, Rotterdam, £24 10s. RAPE OIL was quiet. Crude extracted, £34 10s.; technical, refined, £35 10s., naked, ex wharf. COTTON OIL was firmer. Egyptian crude, £28 10s.; refined common edible, £33; deodorised, £35, naked, ex mill (small lots, £1 10s. extra). TURPENTINE was again dearer. American spot, 40s. 3d. per cwt.

HULL.—LINSEED OIL, spot, quoted £28 10s. per ton; Aug., £28; Sept.-Dec., £27 15s.; Jan.-April, £27 10s. COTTON OIL, Egyptian, crude, spot, £29 10s.; edible, refined, spot, £32; technical, spot, £32; deodorised, £34, naked. PALM KERNEL OIL, crude, f.m.q., spot, £23, naked. GROUNDNUT OIL, extracted, spot, £34; deodorised, £37. RAPE OIL, extracted, spot, £33 10s.; refined, £34 10s. SOYA OIL, extracted, spot, £29 10s.; deodorised, £32 10s. per ton. COD OIL, f.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL, pharmaceutical, 43s. per cwt.; firsts, 38s.; seconds, 36s. TURPENTINE, American, spot, 43s. per cwt.

Weekly Prices of British Chemical Products

PRICES generally have remained unchanged during the week, but in the rubber chemical section there have been slight reductions in the price of cadmium sulphide, lampblack and lithopone. A number of coal tar products have also shown a reduction in price. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—Another relatively quiet week has been experienced on the Manchester market for chemical products, the Bank Holiday on top of the normal holiday season having had a noticeable effect on the volume of buying on this centre. To some extent, also, it has restricted the movement of chemicals into consumption in Lancashire and West Yorkshire, although the outlook generally is regarded as satisfactory and more active conditions are looked for about the end of the present month. In the meantime, a satisfactory feature is the continued slight improvement in the Lancashire cotton trade, with its favourable reaction upon the demand for chemicals for dyeing and finishing purposes. Price conditions generally are on a steady basis. By-products this week have also been affected by the prevailing quietness, though in most cases values keep up.

GLASGOW.—Business in general chemicals has again been rather quiet during the week on account of the holidays in several districts, and export business also has been limited. Prices, however, continue very steady at about last week's figures with only slight changes to report. Prices are being well maintained for the more refined coal tar products. The cruder fractions alone remain comparatively uninteresting. Pitch is dull and creosote shows little movement. As anticipated the price of washed oils has slackened a fraction. Main interest continues to centre on cresylic acid. All grades, excepting high boiling, show a further advance in price. Certain specifications of the purest grades are very competitive. Very little new business has been arranged in high boiling, even at the low figure of 1s. 8d.

Price Changes

Rubber Chemicals.—CADMIUM SULPHIDE, 3s. 9d. to 4s. per lb.; LAMPBLACK, £25 to £27 per ton; LITHOPONE, 30%, £16 to £16 5s. per ton.

Coal Tar Products.—NAPHTHA, solvent, 95/160%, 1s. 7d. per gal.; TOLUOL, 90%, 1s. 11d. per gal.; pure, 2s. 3d. XYLOL, commercial, 2s. per gal.; pure, 2s. 2d.

Pharmaceutical and Photographic Chemicals.—SODIUM NITROPRUSSIDE, 13s. per lb.; SODIUM POTASSIUM TARTRATE (Rochelle salt), 70s. per cwt. net.

General Chemicals

ACETONE.—LONDON: £62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—40% technical, £16 12s. 6d. per ton. LONDON: Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £48 to £50.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—Flaked, 10d. per lb., less 2½%; ground, 10¼d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. per lb. less 5%.

ACID, CRESYLIC.—97/100%, pale, 2s. 10d. to 2s. 11d. per gal; 99/100%, refined, 3s. 3d. to 3s. 9d. per gal.

ACID, FORMIC.—LONDON: £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 10s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. LONDON: 11½d., less 5%. SCOTLAND: 11¾d. less 5%. MANCHESTER: 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £7 per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 10s. ex store. MANCHESTER: White powdered Cornish £20 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £11.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton in casks, special terms for contract. SCOTLAND: £9.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—3s. 9d. to 4s. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 18s. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£25 to £27 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £34, brown £33.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £31 per ton less 2½%, carriage paid.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £6 17s. 6d. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3⅝d. per lb.

PHENOL.—6¾d. to 7¼d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5¼d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. per lb. less 5% carriage paid. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4¼d. per lb. MANCHESTER: £38 per ton.

Potassium Chromate.—6½d. per lb. d/d U.K.
Potassium Iodide.—B.P., 5s. 2d. per lb.
Potassium Nitrate.—Scotland: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
Potassium Permanganate.—London: 8¼d. per lb. Scotland: B.P. Crystals, 8¾d. Manchester: B.P. 11d.
Potassium Prussiate.—London: Yellow, 7½d. to 8d. per lb. Scotland: 7½d. net, ex store. Manchester: Yellow, 8¼d. to 8½d.
Salammoniac.—First lump spot, £41 17s. 6d. per ton d/d in barrels. Scotland: Large crystals, in casks, £36.
Soda Ash.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.
Soda, Caustic.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. Scotland: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. Manchester: £13 5s. to £14 contracts.
Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
Sodium Acetate.—London: £21 per ton. Scotland: £17 15s. per ton net ex store.
Sodium Bicarbonate.—Refined spot, £10 10s. per ton d/d station in bags. Scotland: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. Manchester: £10 10s.
Sodium Bichromate.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. London: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. Manchester: 4d. per lb. Scotland: 4d., less 5% carriage paid.
Sodium Bisulphite Powder.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.
Sodium Carbonate, Monohydrate.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, Scotland: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.
Sodium Chlorate.—£29 per ton. Scotland: £1 10s. per cwt.
Sodium Chromate.—4d. per lb. d/d U.K.
Sodium Hyposulphite.—Scotland: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. Manchester: Commercial, £10 5s.; photographic, £14 10s.
Sodium Iodide.—B.P., 6s. per lb.
Sodium Metasilicate.—£14 per ton, d/d U.K. in cwt. bags.
Sodium Nitrite.—London: Spot, £18 5s. to £20 5s. per ton d/d station in drums.
Sodium Perborate.—10%, 9¼d. per lb. d/d in 1-cwt. drums. London: 10d. per lb.
Sodium Phosphate.—£13 per ton.
Sodium Prussiate.—London: 5d. to 5¼d. per lb. Scotland: 5d. to 5⅜d. ex store. Manchester: 5d. to 5¼d.
Sodium Silicate.—140° Tw. Spot, £8 per ton. Scotland: £8 10s.
Sodium Sulphate (Glauber Salts).—£4 2s. 6d. per ton d/d Scotland: English material, £3 15s.
Sodium Sulphate (Salt Cake).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. Scotland: Ground quality, £3 5s. per ton d/d. Manchester: £3 2s. 6d. to £3 5s.
Sodium Sulphide.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. Scotland: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. Manchester: Concentrated solid, 60/62%, £11; commercial, £8.
Sodium Sulphite.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.
Sulphate of Copper.—Manchester: £15 per ton f.o.b. Scotland: £16 10s. per ton less 5%.
Sulphur.—£9 to £9 5s. per ton. Scotland: £8 to £9.
Sulphur Chloride.—5d. to 7d. per lb., according to quality.
Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
Vermilion.—Pale or deep, 4s. 6d. per lb. in 1-cwt. lots.
Zinc Chloride.—Scotland: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
Zinc Sulphate.—London: £12 per ton. Scotland: £10 10s.
Zinc Sulphide.—10d. to 11d. per lb.

Coal Tar Products

Acid, Cresylic.—97/99%, 2s. 10d. to 2s. 11d. per gal.; 99/100%, 3s. 3d. to 3s. 9d. per gal., according to specification; pale 98%, 3s. to 3s. 1d.; dark, 2s. 4d. to 2s. 5d. Glasgow: Pale, 99/100%, 2s. 9d. to 3s. 3d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 3d. to 2s. 4d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

Acid, Carbolic.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 2s. 3d. to 2s. 6d. per gal. Manchester: Crystals, 6¾d. per lb.; crude, 2s. 7d. per gal. Glasgow: Crude, 60's, 2s. 4d. to 2s. 6d. per gal.; distilled, 60's, 2s. 8d. to 3s.

Benzol.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. London: Motor, 1s. 3½d. Glasgow: Crude, 8½d. to 9d. per gal.; motor, 1s. 3d. to 1s. 4d.

Creosote.—B.S.I. Specification standard, 5½d. per gal. f.o.r. Home, 3¾d. d/d. London: 4½d. f.o.r. North; 5d. London. Manchester: 4¾d. to 5½d. Glasgow: B.S.I. Specification, 5½d. to 5¾d. per gal.; washed oil, 4½d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

Naphtha.—Solvent, 90/100%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. London: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. Glasgow: Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4d. to 1s. 5d.; 90% 190, 1s. to 1s. 1d.

Naphthalene.—Crude, whizzed or hot pressed, £16 10s. per ton; purified crystals, £25 per ton in 2-cwt. bags. London: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. Glasgow: Fire lighter, crude, £7 to £8 per ton (bags free).

Pyridine.—90/140%, 5s. to 7s. per gal.; 90/180, 2s. 3d. Glasgow: 90% 140, 6s. to 6s. 6d. per gal.; 90% 160, 5s. to 5s. 6d.; 90% 180, 2s. 6d.

Toluol.—90%, 1s. 11d. per gal.; pure, 2s. 3d. Glasgow: 90% 120, 1s. 11d. to 2s. per gal.

Xylol.—Commercial, 2s. per gal.; pure, 2s. 2d. Glasgow: Commercial, 2s. to 2s. 1d. per gal.

Pitch.—Medium, soft, 35s. to 36s. per ton, in bulk at makers works. Manchester: 32s. 6d. f.o.b., East Coast. Glasgow: f.o.b. Glasgow, 32s. 6d. to 35s. per ton; in bulk for home trade, 32s. 6d.

Nitrogen Fertilisers

Sulphate of Ammonia.—August, £6 14s. 6d. per ton; September, £6 16s.; October, £6 17s. 6d.; November, £6 19s.; December, £7 0s. 6d. for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station. Manchester: Brown, £9; grey, £10 10s.

Calcium Cyanamide.—August, £6 15s. per ton; September, £6 16s. 3d.; October, £6 17s. 6d.; November, £6 18s. 9d.; December, £7: carriage paid to any railway station in Great Britain in lots of 4 tons and over.

Nitro-Chalk.—£7 5s. per ton to end of September.

Nitrate of Soda.—£7 12s. 6d. per ton to end of September.

Concentrated Complete and Ammonium Phosphate Fertilisers.—Prices have not yet been fixed and at present it is impossible to give any indication as to the date of any announcement or of the trend of prices.

Wood Distillation Products

Acetate of Lime.—Brown, £8 to £8 10s. per ton; grey, £10 5s. to £10 15s. Liquor, brown, 30° Tw., 8d. per gal. Manchester: Brown, £9; grey, £10.

Charcoal.—£5 to £10 per ton, according to grade and locality.

Methyl Acetone.—40-50%, £45 to £48 per ton.

Wood Creosote.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

Wood, Naphtha, Miscible.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 9d. per gal.

Wood Tar.—£2 to £2 10s. per ton.

Intermediates and Dyes

Acid, Benzoic, 1914 B.P. (ex Toluol).—1s. 9¼d. per lb.
Acid, Gamma.—Spot, 4s. per lb. 100% d/d buyer's works.
Acid, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
Acid Naphthionic.—1s. 8d. per lb.
Acid, Neville and Winther.—Spot, 3s. per lb. 100%.
Acid, Sulphanilic.—Spot, 8d. per lb. 100%, d/d buyer's works.
Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.
Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.
o-**Cresol 30/31° C.**—6d. per lb. in 1-ton lots.
p-**Cresol 34-5° C.**—1s. 6d. per lb. in ton lots.
m-**Cresol 98/100%.**—1s. 7d. per lb. in ton lots.
Dichloraniline.—1s. 11½d. to 2s. 3d. per lb.
Dimethylaniline.—Spot, 1s. 6d. per lb., package extra.
Dinitrobenzene.—8d. per lb.
Dinitrotoluene.—48/50° C., 9d. per lb.; 66/68° C., 10½d.
Dinitrochlorbenzene, Solid.—£72 per ton.
Diphenylamine.—Spot, 2s. per lb., d/d buyer's works
α-**Naphthol.**—Spot, 2s. 4d. per lb., d/d buyer's works.
β-**Naphthol.**—In bags, £88 15s. per ton; in casks, £89 15s.
α-**Naphthylamine.**—Lumps, 1s. per lb.; ground, 1s. 0½d.
β-**Naphthylamine.**—Spot, 2s. 9d. per lb., d/d buyer's works.
o-**Nitraniline.**—3s. 11d. per lb.
m-**Nitraniline.**—Spot, 2s. 7d. per lb., d/d buyer's works.
p-**Nitraniline.**—Spot, 1s. 8d. per lb., d/d buyer's works.
Nitrobenzene.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.
Nitronaphthalene.—9d. per lb.; P.G., 1s. 0½d. per lb.
Sodium Naphthionate.—Spot, 1s. 9d. per lb.
o-**Toluidine.**—9½d. to 11d. per lb.
p-**Toluidine.**—1s. 11d. per lb.

(For latest oil prices see page 127.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH SUGAR CORPORATION, LTD., London, W.C. (M., 8/8/36.) July 24, £750,000 debenture stock secured by Trust Deed dated July 17, 1936; general charge.

COAL AND ALLIED INDUSTRIES, LTD. (late Motor Fuel Proprietary, Ltd.), London, E.C. (M., 8/8/36.) July 23, debenture, to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. January 14, 1936.

SMEDLEY AND RELPH, LTD., Leigh-on-Sea, chemical manufacturers. (M., 8/8/36.) July 21, £1,000 debentures; general charge.

Company Winding-up Voluntarily

N.D.K. LABORATORIES, LTD. (C.W.U.V., 8/8/36.) By reason of its liabilities. July 27. E. C. Shaw, of 85, New Oxford Street, W.C.1, accountant and auditor, appointed liquidator and confirmed by creditors.

Company News

Blythe Colour Works.—An interim on the ordinary shares for the period ending December 31, 1936, of 5 per cent., less tax, will be payable August 18.

International Nickel Co. of Canada.—The directors have declared a quarterly dividend of 35c. per share, payable on September 30 to stockholders of record August 31. At the beginning of May the company declared a dividend of 30c. In the two quarters previous to that dividends of 25c. per share were paid.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British West Indies.—A commission agent established at St. George's, Grenada, wishes to obtain the representation, on a commission or consignment basis, of United Kingdom manufacturers of cooking oils, laundry blue and soap. (Ref. No. 103.)

Portugal.—An agent established at Lisbon wishes to obtain the representation of United Kingdom manufacturers of chemicals, drugs, aniline dyes, and other products for textile factories. (Ref. No. 111.)

Brazil.—A firm in Rio de Janeiro desires to obtain the representation of United Kingdom exporters of chemical products for textile mills. (Ref. No. 116.)

Brazil.—An agent in Rio de Janeiro wishes to obtain the representation, on a commission basis, of a United Kingdom firm of exporters of shellac, gum arabic and tragacanth. (Ref. No. 114.)

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